

Backus (H.)

PATHOLOGICAL PHENOMENA

GENERALIZED.

By H. BACKUS.



MONTEVALLO, ALABAMA:

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"The nature of all affections is the same; they differ only in relation to their seat. I think that they only show themselves under so many different forms on account of the great diversity of parts where the disease is located. Their essence is one and so is the cause that produces them."—*Hippocrates*.

"It will probably be one of the most certain results of future research, to associate together, by the connection of causes of common kind, diseases now regarded as wholly distinct in their nature, and arranged as such in our systems of nosology. This remark applies very widely throughout all the genera of disease."—*Holland's Medical Notes and Reflections*.

Science *creates* nothing—cannot overturn or set aside a single *fact* in any order of phenomena, its sole province being that of discovering Relations, of connecting together scattered fragments of knowledge (isolated facts); systematizing them, thereby rendering more available in practice what is already known, or implied in the known.

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INTRODUCTION.

TO DEMONSTRATE the *point of agreement* among pathological phenomena is the object of the following argument. As no single individual could go but little way, by his own efforts, in a subject so complex and difficult, we must necessarily avail ourselves of the labors of others—our predecessors and cotemporaries. It is the work of generations, of ages, to construct the complex materials with which we have to do, into a Science.

Science is not made, but grows.

To develop the subject-matter, then, and show the connections among pathological phenomena already attained, we must quote largely from others; and the works from which our extracts are taken are the common books of reference now in use by the medical profession—the common text-books of the principal medical colleges in Great Britain and the United States—and the inference is that no higher authorities are known to medicine.

To appreciate the scientific significance of those extracts it must be remembered that they are generalizations from experience; and that, *combined*, they very nearly exhaust the subject in hand; while at the same time no one of their authors wrote with reference to such combination.

Now, we propose to make this combination, to supply the links of connection necessary to bring the whole immense variety of pathological phenomena under one general law.

Being dependent upon others for aid in working out this problem, no radically new theory can be proposed. As a scientific generalization cannot precede the facts to be generalized, it follows that whenever pathological phenomena are successfully connected together, little that is *new*, or which is not *implied* in the knowledge of those acquainted with the subject-matter, can be revealed. The general law is implied in the most simple pathological state, or familiar fact, just as the law of gravitation is implied in the familiar fact of the weight of bodies on the surface of the earth.

A correct theory cannot contradict or set aside known facts in

pathology, any more than Newton's Theory of Gravitation could contradict or set aside Kepler's laws. The known facts are a test of the correctness of a theory. Kepler's facts were demonstrated before the theory of gravitation was established, and they were a test of its correctness; since, if that was correct, it must lead deductively to Kepler's laws; and it did. Let no one reject this theory then because it accords with the Known, since no theory could otherwise, by possibility, be true.

Such was the Introduction to an Essay upon this subject which we published in 1860; and although there be much repetition in what we have now to add, we feel the necessity of doing, in this place, all in our power to clear away the difficulties and obstructions which lie in our path. We have undertaken to solve a difficult problem, and need all the assistance from comparison or analogy that we can get.

We have attempted in the following argument to show the Relation which pathological phenomena bear to each other. We are not, therefore, to inquire into the "Nature," "Essence," or "Efficient" cause of those phenomena; but simply to ascertain their relations of succession and similitude.

Theological and Metaphysical methods of investigation deal with the Absolute, with the nature, essence, or efficient cause, of phenomena, and are therefore not applicable to our subject.

The Inductive Method, on the contrary, deals with Relations—the order of occurrence and coëxistence of phenomena—and consequently is the one which must guide and control this argument.

Admitting the argument to be true, experience teaches that there will be difficulties and obstructions in the way of its ready reception.

The first difficulty in the way, is the source from whence it springs. We have been asked, how could we, an obscure and unlearned man, hope to succeed with a subject where so many mighty intellects had failed? The tendency of this is to pre-judge the case—to decide against, before or without investigating the argument. We trust that some of our readers will reserve this point until they have gone through with what we have to say, remembering that "a cripple in the right way will beat a racer in the wrong."

A second obstruction is to be found in our *previous conceptions*.

It is extremely difficult for the human mind to at once recognize and appreciate conceptions, however true, which come in conflict with its previous habits of thought. Hence, one reason why all scientific generalizations are rejected for a time by the great majority of what are called intelligent minds. In other words: as we of this age bear the same relation to phenomena yet to be generalized, that the cotemporaries of Newton and Harvey did to the phenomena which they respectively connected together, it follows, that whoever successfully generalizes pathological phenomena will meet with the same kind of difficulties that they did. Although Newton's generalization was correct, how was it received by his cotemporaries? "Authority scowled upon it, and taste was disgusted by it," says Dr. Chalmers, "and all the beauteous speculation of former days was cruelly broken up by this new announcement of the better philosophy."

As for Harvey, he lost his reputation and practice for years. Physicians would not even consult with him; and the very boys on the street would cry out as he passed, "There goes the crack-brained Harvey!"

"In the intellectual as in the physical, men grasp you firmly and tenaciously by the hand, creeping close at your side, step by step, while you lead them into *darkness*, but when you lead them into sudden light, they start and quit you."—*W. Savage Landor*.

A third difficulty arises from the influence of Names. Language, though a great, is not an unmixed good. "Being a powerful instrument for fixing ideas in the mind, it gives equal aid to the false and the true, and thereby tends to perpetuate the reign of whatever errors have once been clothed in words." A natural tendency of language is to fix in the mind the idea that everything has a *separate existence* which has a *separate name*; and it requires long experience and familiar acquaintance with the subject-matter, to eliminate the error. To a person unacquainted with the subject-matter, the separate names, Atlantic, Pacific, Indian, Northern, and Southern Oceans, fixes in his mind the idea that there are separate existences, or separate and distinct bodies of water corresponding to those names; but a person acquainted with the subject-matter knows that they are not separate and distinct bodies of water; that those names are marks put upon different localities in the same great ocean.

Pathology may be compared to that ocean; and the names of

special diseases are merely marks put upon organs, localities, and symptoms, to render them subjects of discourse; but like those before mentioned, they do not imply separate existences or causes. To illustrate: "Congestion of the intestines causes diarrhœa; congestion of the uterus, leucorrhœa; congestion of the kidneys, watery, and sometimes albuminous urine; congestion of the lungs and pleura, hydrothorax; of the heart, hydropericardium; of the abdomen, ascites," &c.—[*Williams' Principles of Med.*] Now, if the names diarrhœa, leucorrhœa, albuminuria, hydrothorax, hydropericardium, ascites, &c., were connotative, if they implied states or conditions, it is evident that their connotation would reside in the common condition—congestion—as the cause of all.

A fourth impediment arises from the Diversity exhibited by pathological phenomena. How is it possible that this great diversity can be reduced to a common cause? It may assist in removing this difficulty to reflect that quite as great diversity in the phenomena of the physical world around us, has been reduced to a common law—the law of gravitation.

Another difficulty arises from the supposed *tendency* of our argument. We have been told that our theory was too mechanical, too materialistic; that to subject pathological and physiological phenomena to invariable natural laws, was but little short of demonstrating that sociological phenomena were also subject to such laws, and that this doctrine would reduce us to mere machines, destroy our responsibility, and have a pernicious tendency.

The question is not as to any supposed tendency of the argument, but simply: Is it true?

But if sociological phenomena are subject to invariable natural laws, it does not follow that our responsibility would thereby be destroyed.

Down to the time of Copernicus, it was assumed that the earth stood still, and the sun revolved around it. Under this hypothesis, astronomy made slow progress. Copernicus *reversed* this opinion of his predecessors and contemporaries, and assumed that the sun stood still, and the earth revolved around it. Under this hypothesis, astronomy rapidly advanced.

In like manner we must *reverse* our opinions upon other orders of phenomena, if we would get upon the right road. It is *because* social phenomena are subject to invariable natural laws, and that we have a power of *modifying* those laws, that we are responsible.

The engineer has no absolute control over his locomotive, or he could stop it in an instant; but he has a relative or limited control—can modify the laws which regulate its movements, and gradually bring it to a stand; and for this power of modifying natural laws, he is responsible.

In the same way, we are conscious that we have some control over our conduct or actions; we have no absolute control over them, cannot absolutely control the circumstances which environ us and which excite those actions; but we have a relative or limited control, and within those limits, are responsible.

If social or political phenomena were not subject to invariable natural laws, what lessons could we learn from History? What inferences could we draw from the Past, or what calculations make for the Future, upon social or political questions? Or what utility would Observation and Experience be?

No one seems alarmed at the expressions that “the circumstances being the same, men will act the same;”—that “history repeats itself,” and the like; but these are only different ways of expressing the fact that social phenomena are subject to invariable natural laws.

Men cannot quarrel and destroy each other over questions upon which they really *agree*; and if social phenomena are directed by chance, by caprice, or by a variable will, it is clear that agreement is unattainable.

There was a time when the man who should say that astronomical phenomena were subject to invariable natural laws, was deemed worthy of the Inquisition; a time when nations drew their auguries of war from the skies; but civilized nations could not now imprison a man for such a declaration, or be made to go to war upon an astronomical question. And why? Because all now *agree* that those phenomena are subject to invariable natural laws. When that day comes for sociology—as come it surely will—then will legislators understand that they have nothing to do with the absolute; that they have neither the right or power to arbitrarily and indefinitely control the laws which govern social or political phenomena; that it is only within certain limits they may modify those laws for good; beyond those limits, to the injury of all. Then will that Moloch of the mind—Absolute Conceptions—that theologico-metaphysical Juggernaut—deductions from *a priori* premises, without verification—which has crushed the hopes and

hearts of so many millions of our race,* disappear from among men, and the "spear be beat into a plough-share, and the sword into a pruning-hook."

Another impediment: We have been told, that if disease was a unit, then the treatment of all special diseases would be precisely the same, and that this was contradicted by experience, and was evidently absurd.

Granted that the inference is absurd, it is not our inference. Because there is unity, does it follow that there is no diversity? There may be points of agreement, equality, or unity among all men, but does it follow that there is no diversity among them—no *degrees* of physical, intellectual, and moral power, and that the treatment must not be adapted to those degrees? If there was no diversity, then indeed would the treatment be the same in all cases; but there being diversity, necessitates a *modification* of treatment *adapted* thereto; not different in kind, but in *extent*, or *degree*.

All plants and animals originate from cells, and in this particular, interesting, and important respect, are equal, or a unit; but does it follow that they are equal in all other respects, and require precisely the same treatment? We shall see that the treatment must be *adaptive*—adapted to conditions, to degrees, or to diversity as well as to unity.

We have been asked, supposing our argument true, *what good* will it do? This question has been asked of every discovery which has benefitted mankind. When Fulton was about to put his opinions of the practicability of applying the power of steam to the propulsion of vessels on the surface of water to the test of experiment, there were but few in the concourse of people assembled to witness it that believed in the possibility of its success; and when he had demonstrated it before their eyes, they turned on their heels in contempt and asked, well, suppose he has succeeded, what good will it do? Their minds were not *fitted to conceive* the mighty results that were to grow out of the success of that experiment. *The question is not asked by this generation.*

As a Profession, none surpass the Medical in labor and intel-

*For example: "All men are created free and equal." The terms of this proposition are used in an absolute sense, and the proposition itself, and the deductions therefrom, are held to be self-evident—furnished by the mind independent of experience, needing no verification.

Now, it would not be difficult to demonstrate that the lives of hundreds of thousands of American citizens, and the liberties of the American people, have been sacrificed to these absolute conceptions and *a priori* deductions.

ligence; but for want of general principles to guide and harmonize them, much of that labor and intelligence is lost by misdirection—weakened by being diverted into a thousand different channels. To concentrate that labor and intelligence into *one* channel, must speedily be productive of good.

Again: When the phenomena of the heavens were reduced to invariable natural laws, a world of superstition vanished from the minds of men, in that order of phenomena. In like manner, to reduce pathological phenomena to invariable natural laws would be to rid the mind of a vast amount of superstition in that order of phenomena also. Moreover, to reduce any order of phenomena to invariable natural laws, is to close controversy, and diminish the number of causes of strife and contention among men.

Finally, upon this point, the diseases and remedies of the Natural Body furnish a standard of comparison—scientific equivalents—for those of the Body Politic. Social Science cannot be constructed *a priori*, from materials furnished by the mind independent of experience, as theologico-metaphysical philosophers contend, but like other sciences, it must grow out of the experience and wisdom of ages—must grow out of the antecedent orders of phenomena upon which it depends, and through which it can alone be illustrated and explained. The relations of phenomena are discovered in the order of their complexity, the more simple first, and then the more and more complex; and the latter can only be explained by bringing them into relation or connection with the former. Now the diseases and remedies of the body politic are one degree more complex and special than are those of the natural body; and the former can only be illustrated through the latter. Hence the necessity of first generalizing pathological phenomena before a social science is possible—demonstrable.

Other hindrances and impediments will be considered in a more general way.

There would seem to be a misapprehension on the part of many as to the real character of a scientific discovery. In the case of pathological phenomena many seem to think that whenever the law which binds them together shall be discovered, something strictly *new*, some great mystery, or something which will strike the mind with wonder and astonishment, will be revealed; whereas, in truth, nothing which is not implied in what is already known, can, in reality, be made to appear. Take the discovery of the circulation as

an example. It was known before Harvey's discovery that blood circulated. His preceptors taught him that blood circulated in the veins, in the arteries, and in the lungs; but that they were distinct, specific systems, having no relation or connection. Harvey generalized—showed the relation which these supposed distinct systems bore to each other—connected them together. These links of connection were new in this, that they were not recognized before; they extend knowledge, and give a mighty impetus to science; but it is easy to see that they do not differ, in kind, from the known. They are but connecting links in the Chain of Science.

So of Newton's discovery. He did not discover that apples fell to the ground; that the earth was round; that its orbit was an ellipse; that it revolved on its axis, and around the sun. These facts were discovered by his predecessors and cotemporaries. Newton generalized—showed the relation which they bore to each other, connected them together; showed that the cause of the fall of an apple to the earth, and the cause of the earth's revolution around the sun, was a Unit.

Now, whoever shall discover the law which binds pathological phenomena together, will do so by showing the *relation* which they bear to each other, by connecting the facts and minor generalizations attained by his predecessors and cotemporaries, into one great Whole.

Simple and familiar as is the connection of the circulation to us of the present day, how was it received by the cotemporaries of Harvey? With scorn and derision! And this is the history of all the discoveries which have so largely benefitted mankind.

Scientific explanations are too simple and common to gratify our love of the marvelous. Besides, *habits* of thought, *chronic* opinions, are not easily or speedily surrendered. Ignorance (not of literature and dead languages, but) of the Relation of Terms—of Natural Laws—of the relations we bear to each other and the world around us, is one great cause of our physical, social and political sufferings. So long as Relative terms are used in an Absolute sense, so long will there be misunderstanding, disputation, wrangling, and shedding of blood. But there is a better day coming for Humanity. The Inductive method of investigation is inaugurating that day.

That method deals only with relations. It is with the relations

of phenomena, their order of occurrence and coëxistence, that we have to do.

To explain an unknown or obscure phenomenon is simply to bring it into relation or connection with the appreciable or known.

What relation does Fever, an unknown or obscure phenomenon, bear to Dropsy, a known and simple phenomenon? It bears this relation, that the state known as Congestion invariably precedes and coëxists with each. Why is congestion said to be the cause of flux, hemorrhage and dropsy?

We understand by the term Cause, the *assemblage of conditions* upon which a phenomenon depends. These conditions are all equally essential to the development of the phenomenon, but they are not all equally essential, practically, to us; and we single out the most prominent condition, or the one which we can modify for our advantage, and by way of Eminence, or to fix Responsibility, call it the Cause.

It is in this latter sense that we use the term congestion. We do not affirm that *all* the conditions are the same in every special disease, but that *one* condition—congestion—is common to all; the Diversity depending upon the difference in the function or properties of the organ or tissue congested. Congestion of the brain, for instance, produces phenomena *peculiar* to that organ. Here the brain is one of the conditions of those peculiar phenomena, and congestion is the last condition, or the one upon whose occurrence the phenomena appear. Now we cannot remove those phenomena and restore the subject to health by removing his brain. We cannot remove *that* condition, but we may sometimes remove the essential condition of congestion, and thereby remove those phenomena. There may be inflammation of the lungs, stomach, liver or kidneys, and there may be phenomena peculiar to the properties of the organ inflamed; but we cannot remove those phenomena and restore the subject to health by removing those organs. But congestion is an essential condition of inflammation—there could be no inflammation in its absence—and we may sometimes remove this condition and thereby remove the phenomena. Congestion, therefore, is the important and practical condition for us, the one which we may modify for our advantage, and by way of eminence we call it the cause. One of the causes or conditions of the diversity exhibited by pathological phenomena, then, is the function or properties of the organ or tissue affected. Another is

the Degree of congestion. A certain degree of congestion of the brain, for instance, produces headache; a greater degree, stupor; and greater still, convulsions, or coma. A third and last condition which we shall notice here is the Duration of congestion. We are in the habit of saying that gravitation is the cause of the earth's revolution around the sun; but the phrase, "Law of Gravitation," is a generalized expression of the conditions under which phenomena occur; and in the case of the earth's revolution around the sun, one of those conditions is a duration of 365 days for the completion of the phenomenon.

In the same way, a certain duration of congestion is necessary to the recognized development of certain pathological phenomena.

To return to the question: Why is congestion said to be the cause of flux, hemorrhage, and dropsy? Because it *invariably* precedes and coexists with each. But this state also invariably precedes and coexists with inflammation and fever; and if it is not the cause of the latter, there is no reason to consider it the cause of the former. It is said that flux, hemorrhage, and dropsy, are produced by the same cause for the reason that they are *convertible* into each other—that to produce a flux is to relieve a dropsy. The same reasoning includes inflammation and fever, since they as often result from a suddenly suppressed flux, as does dropsy; and are as often relieved by producing a flux, as is dropsy or hemorrhage; and if all cases of fever are not relieved by producing a flux, alone, neither are all cases of dropsy. *They are parallel in all these particulars.*

Now fever has ever been considered one of the most complex subjects in pathology. And why? Because along with the increased arterial action and increased heat, which may be said to properly constitute fever, there often appear a great number of other phenomena, as flux, hemorrhage, dropsy, pain, dyspnoea, headache, stupor, delirium, convulsions, coma, etc. Let us analyze this complex state.

If we apply a ligature to a vein, we dam up the blood behind the ligature; the pressure of the accumulating blood dilates or distends the vein, and we have the state known as congestion;—the retrograde pressure of venous blood extends to the capillaries, and when it attains a certain degree, the serum is forced through their thin parietes into the surrounding cellular tissue, or into a closed cavity, constituting dropsy. But dropsy is not the only phenome-

non which appears in connection with a retrograde pressure of venous blood in the capillaries. If the vein ligatured be the one which returns the blood from the bowels, the effusion may take place from their free or mucus surface, and then there appears the phenomenon known as flux, or diarrhœa. If the pressure passes a certain degree, the capillaries are ruptured, and we have hemorrhage. If the veins ligatured be those that return the blood from the head, the retrograde pressure of venous blood extends to the brain, and there appear headache, stupor, delirium, convulsions, coma, apoplexy, paralysis, effusions, etc. If the great veins emptying into the heart be ligatured—as they sometimes are by dilatation or valvular disease of that organ—there is general venous congestion, and a great multitude of other phenomena appear in connection with those already mentioned. Now the phenomena which have appeared from these experiments are those which sometimes coëxist with fever. Does venous congestion coëxist with fever? It does. Then we have an *explanation* of the attendant phenomena. If venous congestion is present and competent to the production of all the phenomena which attend fever, may we not go one step farther, and say that it is the cause of increased arterial action also? Is it not appreciable that the retrograde pressure of venous blood in the capillaries should obstruct the arterial circulation; that the pressure of blood upon the left ventricle of the heart should thereby be increased; that this increased pressure of blood should excite that ventricle to increased action? The answer is in the affirmative, as is recognised in hypertrophy. We may now see the point of agreement, the *relation* which this great multitude of phenomena bear to each other.

Admitting the foregoing analysis of fever to be correct—we shall see it demonstrated in the course of this argument—the very simplicity of the explanation, for reasons before stated, will hinder its reception. We have often been told, when talking upon this subject, that there was nothing *new* in the idea that congestion played a conspicuous part in the production of simple pathological phenomena; that medical works were *full* of the doctrine; that even common people were always speaking of congestion; forgetting that these facts, *of themselves*, constituted it of the highest possible scientific importance. Common and familiar as is the fact of congestion, it is not more so than was that of the weight of bodies on the surface of the earth previous to the establishment of

the law of gravitation; and yet witness the agency of this familiar fact in the construction of the science of astronomy. So common and familiar was the fact of the weight of bodies on the surface of the earth, that it might be said that *every man held the law of gravitation in his hands*.* So of congestion, *it is on every man's tongue*.

The agency of congestion, in the production of simple pathological phenomena, is recognized and admitted; but when we advance to more complex phenomena, other causes are deemed necessary to account for their production.

We repeat, that on all subjects, the most simple and common facts are the most important; and this, not only on account of their being *general*, but also because they furnish the key to the investigation and solution of the complex and difficult.

Complex pathological phenomena may be said to hold the same relation to the simple and common, that the woven fabric holds to the single thread. In the complicated web, the single thread is so doubled—*so folded upon itself*—that its continuity seems broken, its connection lost; but by patiently pursuing that thread, its intricate meshes are at last unraveled, and its continuity or connection seen to be complete.

We are now to unravel complex pathological phenomena by

*“For example, men had for *ages* seen pieces of wood, stones, metals, falling to the ground. Newton seized on these particular facts, and rose to the idea that all matter tends, or is attracted towards all matter, and then defined the law according to which this attraction or force acts at different distances;—thus giving us a grand principle, which we have reason to think extends to, and controls the whole outward creation.”—*Channing*.

Compare the preceding quotation with the following, and it will be seen that they agree as to the frequency and familiarity of the particular facts; and if Dr. Watson has not extended the principle to all pathological phenomena, it will be recognized that he goes deep into the heart of the subject:

“I say the blood may undergo important alterations in its *quantity*. It may exist in too great abundance throughout the body; and it may exist in too great abundance in certain parts only of the body. These states have been recognized for *ages*. Sometimes they are called respectively general and partial *plethora*; sometimes general and local *congestions* of blood; people speak also of irregular *determinations* of blood to different organs; and of late the term *hyperæmia*, first invented by M. Andral, in France, has been imported into this country and much adopted here. All these words and phrases mean in truth the same thing; and their *frequent recurrence* in medical works, is, of *itself*, sufficient evidence of the frequency and importance of the conditions which they express.

“If we comprehend rightly this subject of plethora or congestion, we shall be prepared to understand some most important morbid states, of which it seems to be in many, if not in all cases—the earliest approach—the initial step. Inflammation, hemorrhage, dropsy, all acknowledge and imply a previous condition of congestion. ‘There is probably,’ says Dr. Alison, ‘no kind of diseased action of which the body is susceptible which is not connected, sooner or later, with increased afflux of blood towards that part, either as its cause or effect; and the immediate object of all our most powerful remedies is to act on these irregularities of the circulation.’”—*Watsons Practice*, p. 42.

tracing through all their ramifications the single thread of congestion.

Our Essay will be divided into two parts:

In Part I, we shall run a parallel between Inflammation, Fever, and Hypertrophy:

In Part II, we shall employ more directly, and in form, the Deductive Method;—shall apply all the tests known to that method;—shall bring our argument to a level with that which sustains astronomy. More cannot be required. In this part, the subject-matter will be so fully developed, that any one acquainted with the facts and reasoning which sustain the Physical Sciences, will be a competent judge of its validity.

We cannot proceed to our argument without first acknowledging our great indebtedness to the works of Lewes, Mill, and the immortal Comte.

PATHOLOGICAL PHENOMENA GENERALIZED,

PART I.

That Pathological Phenomena have a plan as stable, conditions as fixed, and an order of occurrence as determinate, as have other physical phenomena, and are, therefore, amenable to the same method of investigation, few pathologists of this age will question.

If we turn to the history of Physical Science, we see that Astronomical phenomena were once referred to Supernatural causes—Apollo and his Chariot, then to Metaphysical Entities, Numbers, Harmonies, etc., and, finally, through the instrumentality of what is called the Inductive Method of investigation, were reduced to Positive Science—the Law of Gravitation.

If we look into the Records of Medicine we see that Pathological Phenomena were once referred to supernatural causes—Superintending Intelligent Principles, then to Metaphysical Entities, Vital Forces, Sympathies, etc., and the inference is that, through the application of the same method which perfected Astronomy, they too are destined to be reduced to Positive Science—the Law of Gravitation.

The distinguishing characteristic of the method alluded to, is, that it proceeds with cultivated caution from the Known to the Unknown, and verifies its conclusions by confrontation with Fact.

Of vital forces we know nothing, and, therefore, can predicate nothing. We cannot reach the unknown through the unknown.

Of Pressure (which is resolvable into Gravitation), we know that it can and does produce certain pathological phenomena; and

it is through the avenues of the known that we are to reach the unknown.

That pressure will produce sensations, pleasurable or painful according to its degree and the part pressed upon, any one may verify by experimenting upon his own person at will.

That pressure will obstruct the circulation of blood may be demonstrated by the experiment of applying a ligature to a vein. That the pressure of blood behind the ligature will Dilate the vein and produce the state marked by the term Congestion, will be demonstrated in the same experiment. That the dilatation of the vein implies Debility, or a relative deficiency of power on the part of the vessel (debility being a relative term), is a proposition the truth of which cannot be denied.

The terms Obstruction, Dilatation, Congestion and Debility, then, are marks of each other, and marks of Pressure.

That these terms are marks of each other and marks of pressure, is well illustrated in dilatation of the heart, that phenomenon being produced by pressure, and clearly implying and exhibiting congestion, debility and obstruction.

The illustrations of our argument will be drawn from the Heart.

We shall see that Dilatation of the Heart corresponds to Congestion of the Capillary, to Ague of the System, and to all Passive diseases; and that Hypertrophy of the Heart corresponds to Inflammation of the Capillary, to Fever of the System, and to all active diseases.

We shall see that Dilatation and Hypertrophy are produced by Pressure; and then it will follow that all *related* phenomena are produced by pressure also.

We repeat, that to explain an Unknown or Obscure phenomenon, is simply to bring it into relation or connection with the appreciable or known. Now the cause of dilatation and hypertrophy of the heart, is more appreciable and better known, than is the cause of congestion and inflammation of the capillary, or ague and fever of the system; and we may hope to explain or illustrate the latter by bringing them into relation or connection with the former.

We have said that dilatation of the heart was produced by pressure.

“Dilatation of the heart is a purely mechanical effect of

over-distention. Blood, accumulated in its cavities, exerts a pressure from the centre towards the circumference in every direction; and when once it surmounts the resistance offered by the contractile and elastic power of the parietes, these necessarily yield and undergo dilatation.”—*Hope. p. 293.*

Taking dilatation (congestion) as the most simple pathological state (abundant evidence of which will hereafter appear), disease may be defined to be a *changed relation in the pressure of the fluids and solids upon each other*. It is not without significance that this definition of disease reconciles humoralism and solidism. It is the province of a correct theory to reconcile long controverted questions. We see from the above extract that the term dilatation is a mark put upon a *relatively increased pressure of blood to the returning pressure of the heart or blood vessel*. This term, therefore, implies congestion, obstruction and debility, or *diminished action*. Accordingly we shall see the same phenomena ascribed to each of these terms as the cause; and the significance of their connection appears in the fact that leading theories in medicine have been founded upon them—plethora, obstruction, debility.

Hypertrophy of the heart is also produced by pressure :

“The reader must here again be reminded that the exciting causes of dilatation are equally those of hypertrophy; and that, supposing no unknown agencies to interfere, as may sometimes possibly happen, it depends on the proportion which the cause bears to the reacting energy of the cavity exposed to its influence, whether that cavity becomes affected with dilatation, with hypertrophy, or with a combination of the two.”—*Hope. p. 252.*

The point of agreement (material to the issue) in the terms reaction, inflammation, fever and hypertrophy, is *increased action*; and as hypertrophy is a mark of pressure, therefore, the terms reaction, inflammation and fever, are marks of pressure also. Accordingly we shall see the same doctrines held in relation to the increased action of the capillaries in inflammation, and the heart in fever, and hypertrophy, in producing congestion, effusions, hemorrhage, etc. It is not to the hypertrophy of the heart, apart from its increased action, that agency is attributed; and as we have increased action of the capillaries in inflammation, and of the heart in fever, we shall see the same opinions held in relation to each. They are parallel and illustrative of each other.

The terms dilatation, congestion, debility, obstruction, reaction, inflammation, fever, and hypertrophy, then, are marks of pressure. In other words, the same cause which produces debility, dilatation,

congestion and obstruction, produces reaction, inflammation, fever, and hypertrophy, namely: pressure.

The connection of all these terms may be recognized and appreciated if we reflect that debility or *diminished* action and *increased* action are *relative* states, implying more or less only of the same kind, and consequently produced by the same cause, or differing only in degree. Dilatation corresponds to debility or diminished action, and hypertrophy to increased action, and we have seen that they were produced by different degrees of pressure.

This reconciliation of terms must necessarily reconcile the apparently opposite opinions founded upon them.

“Theories of inflammation: Two opposite opinions have of late divided pathologists. Both parties admit that the capillaries are dilated and contain a larger amount of blood than in health; but they differ widely as to the state of action of the capillaries. By one party it is maintained that these vessels are in a state of *increased* action, at least in the early stage of the inflammation, and that the phenomena are the direct result of an excessive exercise of the vital properties of the part affected; by the other, that they are in a condition of *debility*, at least in relation to the larger vessels from which they are derived, and that their expansion is the result of a loss of balance between the resisting force of the capillaries and the *vis-a-tergo*.”—*Wood's Practice*, vol. 1, p. 42.

We see from the above extract that both parties agree that the capillaries are dilated, congested, in inflammation. By one party it is maintained that this dilatation and congestion is the result of debility; by the other that it is the direct effect of increased action.

How are these apparently opposite opinions to be reconciled? They are to be harmonized by recognizing that they are *not opposite* but *relative*: They are to be reconciled through their point of agreement—congestion—the *state of action* being relative: They are to be reconciled by connecting them through dilatation *with* hypertrophy—the action being debilitated or diminished by the dilatation, and increased by the hypertrophy.

This connects states, terms, and opinions:

“Excess of blood in a part, with motion partly *diminished*, partly *increased*—inflammation.”—*Williams' Principles*.

Excess of blood in the heart, with action partly *diminished*, partly *increased*—hypertrophy; the action being diminished by the dilatation (which excess of blood implies), and increased by the hypertrophy.

“Now, what I have just stated is the distinction between

hypertrophy and inflammation; their general pathology has much in common, their causes are often alike, their modes of production identical.”—*Simons' General Pathology*.

In looking at the condition of the heart in dilatation with hypertrophy, then we see the condition of the capillary in inflammation.

Fever is connected with hypertrophy and illustrated by it.

What are the points of agreement between ague, dilatation, fever and hypertrophy?

These terms are not “principles” or “entities” capable of producing phenomena, but simply marks put upon a pathological state *after* its occurrence. They do not *precede*, but *imply*, congestion.

They are marks of *relative* states. It follows that the phenomena in ague, dilatation, fever, and hypertrophy, are the same in kind.

Differences in the temperature of the body, in the strength of the pulse, in the thickness of the walls of the heart, are not differences of kind, but of degree; and consequently connected through causation. Dilatation and hypertrophy represent these differences, and we have seen that they were connected through congestion or pressure of blood.

In dilatation of the heart we have the feeble pulse, the cool or chilly surface, the pale or livid complexion, the internal congestions, glandular enlargements, and passive phenomena of ague. In hypertrophy of the heart we have the strong pulse, the relatively increased heat of skin, the flushed surface, the internal congestions, glandular enlargements, and active phenomena of fever.

Let Auscultators examine the heart in ague and see if they do not find dilatation; let them examine it in fever and see if they do not find the increased action of hypertrophy!

Sometimes fever does not supervene upon ague. Sometimes hypertrophy does not supervene upon dilatation. Sometimes we have a low form of inflammation, of fever. This is represented in dilatation with hypertrophy, dilatation predominating.

Sometimes we have active inflammation, active fever. This is represented in hypertrophy with dilatation, hypertrophy predominating.

From the earliest records of medicine, inflammation and fever have been considered conservative. Hypertrophy, which has only

been understood in modern times, is considered conservative also; and all for the same reason, namely: That without reaction the congestion, ague, or dilatation, invariably terminated in death; that with reaction, whether it amounted to recognized inflammation, fever, or hypertrophy, or not, a large majority recovered, or life was protracted. Hence it was very natural to look upon inflammation, fever and hypertrophy as conservative.

Finally, for the present, fever and hypertrophy involve the system at large, and a multitude of corresponding phenomena coëxist with them.

What is the condition common to fever and hypertrophy which is sufficiently general to connect the multitude of phenomena, as flux, hemorrhage, dropsy, pain, vomiting, dyspnoea, headache, stupor, delirium, convulsions, coma, etc., etc., which sometimes coëxist with them?

That common condition is venous congestion—an increased retrograde pressure of venous blood in the capillaries.

There being no valves to the internal system of veins, including those of the head and spine, it is appreciable that the retrograde pressure of venous blood may extend to the capillaries of all the organs, thus corresponding to the *general* symptoms.

We will first establish the fact that venous congestion is common to ague, dilatation, fever, and hypertrophy.

“The diseases of the heart exert a very marked influence over the whole economy; nor is it in a narrow or circumscribed circle that these morbid reactions are produced; on the contrary, how numerous are the sympathies which the central organ of the circulation creates in the rest of the organism! It is in consequence of their multiplicity and the difficulty of referring them to *one* perfectly settled cause, that we have decided to study the general symptoms in a purely analytical order. * * * The engorgement of the venous system is one of the extraordinary phenomena pertaining to diseases of the heart.”—*Aran on the Heart*, p. 100.

“And if the local inflammation which can be ascertained to take place during fever, is inadequate to explain the characteristic typhoid symptoms, it is equally in vain to seek an explanation of those symptoms, as some have done, in the mere circumstances of irregular distribution and congestion of blood.

“Even the peculiarities of that form of fever which has been described under the name of Congestive, are not to be explained by the mere circumstance of internal congestion, the existence of which, in the vessels, and especially in the veins of internal parts, in these circumstances, is admitted. For although congestion or

stagnation of blood within the cranium, may be held to be a sufficient cause of stupor, yet we are so far from regarding congestion in the great veins leading to the heart as a sufficient cause for deficient action there, and consequent feeble pulse and cold skin, that we have already stated the accumulation of blood in the great veins to be apparently the chief cause of the increased action of the heart, or the reaction in the more usual form of fever."—*Allison's Outlines*.

The four following quotations will also illustrate the connection of fever and hypertrophy through the fact that the same doctrines are held in relation to their producing, for instance, hemorrhage, as apoplexy :

"There is an alleged exciting cause of cerebral hemorrhage, which I think is the more necessary to consider, because I believe that very erroneous notions prevail about it even among pathologists of eminence. I allude to the imputed dependence of cerebral hemorrhage upon hypertrophy of the left ventricle of the heart. It has been supposed that the powerful contractions of a ventricle thus morbidly strong may drive forward the blood with such unusual force, as to strain and burst the cerebral arteries. Dr. Hope, in his very complete work upon Diseases of the Heart, uses these words: 'Instances of apoplexy supervening upon hypertrophy have been so frequently noticed, that the relation of the two, as cause and effect, is one of the best established doctrines of modern pathology.' Similar opinions are entertained by the most distinguished of the French writers on this subject: Andral, Bouillaud, Cruviellhier. I think they are all wrong; or at least they state their propositions much too broadly and generally.

"I fully admit, no less from my own observation than upon the testimony of others, the frequent coincidence of hemorrhage of the brain, and hypertrophy of the left ventricle of the heart; but I distrust the reasoning which would always connect these events with each other as cause and effect. They may sometimes have this relation; but I have long thought that in most cases, if not in all, the coincidence is capable of being explained upon other and more satisfactory principles. In the first place, hypertrophy of the left ventricle of the heart is very frequently, far more frequently than not, accompanied by other structural changes in the organ; changes which imply some impediment to the circulation; changes which involve or influence its right chambers also. In fact, disease of the right heart is not often seen without disease of the left; and one of the commonest forms of alteration to which the left side is liable, is hypertrophy of its ventricle. Now I have already pointed out to you the connection which sometimes subsists between cerebral hemorrhage and such disease of the heart as obstructs the ready and regular descent of the blood from the head through the veins. Many of the cases of apoplexy occurring in persons who have pre-

viously had cardiac hypertrophy, are, I really believe, cases of this kind. The brain affection is dependent, in part, upon disease of the heart, but not upon the preternatural strength of its left ventricle. The heart acts morbidly upon the brain *through the veins*, and not through the arteries."—*Watson's Practice*, p. 326.

"Although it is evident from the preceding observations, that accumulation of blood in the venous cavity produces this disease (apoplexy) in all those cases in which the pulse is weak, in which cases it is certain that the blood is accumulated in that cavity, yet it may be doubted whether this can be the cause in those cases in which the pulse is strong. Increased action of the heart has been considered the immediate cause in these cases.

"In answer to this it may be observed that this disease appears generally at that time of life when there is a marked tendency to venous plethora, and rarely at that time of life when the action of the heart is most powerful. Few cases occur so early as the fortieth, most over the fiftieth, many over the sixtieth year of life.

"It occurs almost only in those persons who have been habitually exposed to the operation of the remote causes; particularly high living, free drinking, great exertion of mind in deep study, or intense application to momentous affairs, and great anxiety about the result. The inevitable effect of these is accumulation of blood in the venous cavity. The time of life, and the manner of life, therefore, both concur in indicating the presence of accumulation of blood in that cavity, which is certainly present in all such cases.

"The strongest pulse in earlier life does not produce apoplexy. In the most violent fevers I have ever seen, there has been no instance of such an effect; and the only instance I have heard of from neighbouring practitioners occurred in an old man.

"The full habit of persons liable to this disease, the time of life when they are attacked, the known effect of the operation of the remote causes, and the weakness of the pulse in many cases, all point to the fact that accumulation of blood in the venous cavity is the proximate cause. Increased action without such accumulation does not produce apoplexy; without increased action the latter does produce the disease."—*Cooke's Pathology*, v. 2, p. 177.

"Other causes of abnormal circulation in the head and neck exist. Diseases of the heart itself, of which one, hypertrophy, augments the flow of the arterial blood, and of which *all* induce impeded circulation along the veins—a fact of far greater moment—have their influence in inducing the apoplectic state."—*Marshall Hall*.

"In the uncomplicated form of intermittent fever, without malignant tendency, the prognosis is almost always favorable. I have never seen such a case eventuate fatally. It is possible that, when there is a disposition to cerebral disease, with the brain perhaps already softened, fatal apoplexy may be induced in the

paroxysm, either from the venous congestion of the cold stage, or by the strong determination of blood in the stage of reaction." *Wood's Practice*, vol. 1, p. 236.

Having now seen that venous congestion is common to ague, dilatation, fever, and hypertrophy, we have next to inquire into its competency to produce the phenomena which coëxist with them.

That venous congestion or an increased retrograde pressure of venous blood in the capillaries, is competent to the production of all the phenomena which coëxist with ague and fever, has often been demonstrated by the experiment of applying ligatures to the veins of animals, thereby producing this state, and the phenomena in question. In these experiments there seems to have been no difficulty in ascribing the phenomena to venous congestion; but when we have the same state, and the same phenomena, in ague and fever, we must needs go in search of other causes to account for their production.

Is this according to the rules of reasoning in the Anterior Sciences? Having a present and sufficient cause, is it necessary, or are we allowed, to assume others? Let us put the question to the test of experiment.

As dilatation of the heart is an obstruction to the circulation—operates as a ligature to the great veins emptying into it, thereby producing general venous congestion—it furnishes a direct experiment on a large scale on the human subject; and if venous congestion is competent to the production of all the phenomena which coëxist with ague and fever, it follows that they should here be found.*

"In the preceding section I have shown that the effect of dilatation is, to enfeeble the heart, and thereby occasion the phenomena of an obstructed circulation. We have now to examine those phenomena as signs of dilatation.

"GENERAL SIGNS.—The heart, when weakened by dilatation, is subject to palpitations of a feeble, oppressed kind, and more or less distressing, frequent and prolonged, according to the extent of the malady. In general they are protracted. The attacks are provoked by any over-exertion or mental excitement.

"The pulse is soft and feeble, and, if the debility of the heart be very considerable, it is small. Irregularity and intermittence

* It may be proper to state that Dr. Hope, whose detail we shall follow, was not attempting to exhaust the phenomena which appear in this condition of general venous congestion. Other authors on diseases of the heart add many more. Indeed, if we were to bring them all together, the subject would be exhausted, and our general argument verified.

are rare, except during protracted and distressing paroxysms of dyspnœa, or when the vital powers are much exhausted, as in the advanced stage of the disease.

"The languor of the arterial circulation in dilatation causes the extremities and surface to be *chilly*, the disposition to be melancholy, and the character to be deficient in energy.

"The blood, not being freely transmitted by the left ventricle, accumulates in the lungs by retardation: whence difficulty of respiration; cough, sooner or later attended, in many cases, with copious expectoration of thin serous mucus; œdema of the cellular tissue of the lungs greatly aggravating the dyspnœa; terrific dreams with starting from sleep; and passive pulmonary hemorrhage of dark, grumous blood in small quantities, forming sanious sputa, and generally the precursor of death in individuals affected with great difficulty of respiration. After death I have found this hemorrhage connected with pulmonary apoplexy, and always with great engorgement.

"The lungs being obstructed the engorgement is propagated backwards to the right side of the heart, to the great veins, and finally to all their ramifications. From this venous engorgement arises a series of striking phenomena, which we shall review successively, premising that the hemorrhage and dropsy do not generally come on till a late stage of the disease.

"1. *Serous Infiltration.*—This generally makes its appearance first in the lower extremities, because it is in them that the circulation is most languid, the return of blood being opposed by its gravity, while it is little promoted by the action of superincumbent muscles. The œdema gradually ascends, and, under the name of anasæra, may eventually attain the utmost degree over the whole surface of the body. Increased serous exhalation takes place from the serous membranes also: whence, hydrothorax, hydropericardium, and ascites; one or other of which is almost invariably present when there is much external dropsy.

"2. *Discoloration of the Face.*—If the complexion was originally florid, it becomes purple or deep violet on the centre of the cheeks, the end of the nose, and the lips, with intumescence of the latter, while the intermediate parts are pallid and sallow. If originally pale, it becomes cadaverously exsanguine, and has a dusky, leaden or venous cast, especially around the eyes. The lips are either livid or very pale. Lividity sometimes shows itself in the extremities as well as in the face.

"3. *Congestion of the Brain.*—This produces the usual symptoms of passive cerebral congestion, and of the corresponding form of apoplexy, namely: dull headache, felt principally along the course of the great sinuses; hebetude of the mental faculties; stupor, convulsions, and eventually complete coma. It is not unusual for these symptoms to supervene a few days before the fatal termination. Sometimes they depend, not on congestion

alone, but partly also on serous effusion into the ventricles, or on the surface, resulting from the congestion; sometimes, again, the congestion ends in sanguineous apoplexy, of which I have seen several instances. Whence it is incorrect to suppose that this catastrophe is peculiar to hypertrophy of the heart.

“4. *Injection of the Mucous Membranes.*—It is common to find them after death so vascular as to present the appearance of inflammation. This is especially the case in the stomach and intestines, and it is necessary to be aware of the circumstance in order to guard against the error of attributing the redness to inflammation.

“5. *Passive Hemorrhage.*—This takes place from the lungs, as already stated, also from the nose, the stomach, the intestines, the uterus, and more rarely from the bladder. It results from engorgement of the mucous membranes. The effusion consists of dark blood exuding in small quantities. When from the stomach, and not immediately ejected, it has occasionally the appearance of coffee grounds, in consequence of being exposed to the coagulating action of the gastric juice. In the intestines it is often blackened by the intestinal acids—the carbonic, acetic, and sulphureted hydrogen.

“6. *Congestion and Enlargement of the Liver.*—This is so common a consequence of retardation of the blood on the right side of the heart, that few persons so afflicted in any considerable degree, are exempt from it. This has, I believe, been almost entirely overlooked by authors on the diseases of the heart, and is still very little known. By the obstruction which it occasions in the system of the vena porta, it leads to ascites and jaundice; also eminently favors hamatemesis, intestinal hemorrhage, piles, and, though indirectly, uterine hemorrhage—many cases of which I have found to be obstinate till the hepatic enlargement was reduced by mercury and aperients. This latter fact has been noticed by Dr. Locock.”—[*Hope, pp. 300–2.*]

Does not the preceding experiment settle the question as to the sufficiency of venous congestion to produce the phenomena which coëxist with ague and fever?

Cannot physicians recognize therein, the feeble pulse, the cool or chilly surface, the pale or livid complexion, the internal congestions, glandular enlargements, and passive phenomena of acute ague?

Let them sit down and make this calculation—take the phenomena detailed in that experiment *from* the phenomena presented by any, or all forms of acute ague, and *give the remainder*.

If physicians will apply this rigid test, we think they will agree with us, that dilatation of the heart is simply a chronic ague.

We will now analyze Fever:

The preceding experiment enables us to isolate the increased action of fever from the attendant phenomena, and study it apart; enables us to reduce this complex state to its elements.

We have seen that venous congestion precedes and coëxists with fever:—consequently the phenomena detailed in the preceding experiment may coëxist with fever. Let any one take those phenomena from any form of fever—yellow fever, for instance—and look for the remainder, and he cannot fail to recognize the connection.

The phenomena, then, which sometimes coëxist with fever, as flux, hemorrhage, nausea, vomiting, black vomit, jaundice, dyspnoea, pain, headache, delirium, convulsions, coma, etc., do not belong to increased action or fever, *as such*. They all belong to venous congestion *without* fever, as we have seen demonstrated in dilatation of the heart; and as venous congestion precedes and coëxists *with* fever, we see that they are not produced by it. The question then is reduced to the single point—is congestion, or pressure of blood, competent to the production of *increased action*? The answer is in the affirmative, as is demonstrated in hypertrophy; and this leaves but small remainder.

Increased action or fever itself, then, is the result of venous congestion—an increased retrograde pressure of venous blood in the capillaries.

Is this a competent cause? Does this increased retrograde pressure of venous blood in the capillaries, *connect* the increased action of the heart in fever or hypertrophy, *with* the multitude of attendant phenomena?

“It is extremely interesting to observe the influence of impeded or arrested flow of blood in the *veins* upon the *arteries*. I have already alluded to the experiment of applying a ligature on the inferior extremity of the frog in which this is seen under the microscope. The phenomenon deserves to be noticed more particularly.

“If we tie a ligature around the frog’s leg, the web being spread under the microscope, we instantly see the whole circulation, which was equable or nearly so before, become *pulsatory*. If we tie the ligature a little more tightly, the globules of blood are observed to oscillate even in the arteries, and to proceed and to retrograde, at each systole and diastole of the heart.”—*Marshall Hall*.

“Boerhaave proposed a theory of inflammation, which, if it was not altogether original, was, at least, an important modification

of that of Piteairn, and of the mathematical school. He supposed that the blood itself became more viscid, causing a *lensor* in its circulation through the several orders of capillary vessels, an excessive engorgement of them; an increased action of the larger vessels, and flow of blood in them, taking place to overcome the resistance and congestion. The close resemblance of this hypothesis to others much more recently proposed, is very obvious. That the action of the larger arteries should be *increased*, when an obstruction to the circulation through the capillaries exists, may readily be *conceded*; but that the afflux of blood can be increased, and obstruction at the same time exist, is a contradiction in terms."—*Copland's Dictionary*, vol. 2, p. 458.

"Obstruction in the right auricle, whether from this or any other cause, presents an obstacle to the return of the venous blood, and therefore, causes retardation throughout the whole venous system. Nor is this all; for the retardation is propagated through the capillaries to the arterial system, and thus at length returns in a circle to the heart. In this way is explained what at first sight appears an anomaly, namely: that the left cavities are sometimes rendered hypertrophous by an obstruction in the heart situated behind them in the course of the circulation, as for instance, when the left ventricle is rendered hypertrophous by a contraction of the mitral orifice."—*Hope*, 252.

It appears, from the preceding quotations, that venous congestion, or an increased retrograde pressure of venous blood in the capillaries, is competent to the production of the increased action of the heart and arteries, in fever, or hypertrophy. *We have seen that it was present: Therefore—*

In looking at the condition of the system in dilatation with hypertrophy of the heart, we obtain a *full-length likeness* of the condition of the system, in fever.

If the increased action of the heart in fever or hypertrophy does not produce the attendant phenomena, what does it *contribute* to their production? In answer: reaction or increased action *tends* to remove congestion or equalize the pressure of the fluids and solids upon each other; but failing in this, the increased arterial action *coöperates* with the antecedent retrograde pressure of venous blood, to *increase* the pressure in the capillaries. Reaction may therefore diminish or remove congestion in some parts, and thus diminish or remove some of the antecedent phenomena, and it may increase the pressure in other parts, and thus add new symptoms or increase those that remain.

"To this cause, the remora of blood in the veins of the viscera

during the cold stage, is *superadded* the arterial congestion of the same organs during the stage of excitement."—*Art. Intermittent Fever, Cyclopaedia Pract. Med.*

"It must be admitted, however, that hypertrophy does not produce serous infiltration so readily and promptly as a direct, primary obstacle to the return of the venous blood; a fact which admits of a rational and obvious explanation. When there is an obstacle to the return of the venous blood, suppose, for instance, contraction of the tricuspid, pulmonic, or mitral orifice, two causes *conspire* to produce the capillary congestion: namely, the direct pressure of the arterial *vis-a-tergo*, and the retrograde pressure of the retarded venous blood."—*Hope*.

"Active dropsies are sometimes spoken of as belonging to the *left* side of the heart; Passive dropsies to the right. What *connects* all these forms of dropsy is a preternatural fullness, in some part or the whole of the hydraulic machine. And this seems to be the grand key to the entire pathology, as well as to the remedial management of the disease."—*Watson's Practice*.

What shall be said of the PERIODICITY exhibited by pathological phenomena? If we are successful in connecting them through causation, with the phenomena of the world around us, all will have been done which can be required.

The principles of treatment deducible from the premises of this argument, are in accordance with the principles of treatment established by experience.

We have seen that the term Congestion was a mark put upon a *relatively increased pressure of blood to the returning pressure of the heart or blood vessel*.

The obvious indication of treatment, then, is either to diminish the pressure of blood, as by depletion, or increase the counter-pressure of the vessels, as by stimulants, tonics, astringents, bandages, etc., or both. We may be said to do both when we prescribe blue pill to increase secretion, and follow it with quinine to increase the tone or returning pressure of the solids; between the two an equilibrium is sometimes established. Abstinence and exercise may be said to act in the same manner, and are admirably adapted to many minor ailments.

There is a point of *agreement*, then, in the action of stimulants and depletion, upon which point of agreement, their efficacy depends. This reconciles the apparent contradictions so often met with in medical works, as when one recommends stimulants, and

another, depletion, in a disease of the same name, and apparently with equal success. It depends upon the stage of the disease—the degree and duration of congestion—which class of remedies is, at first, most appropriate.

The local treatment for inflammation is the same in kind as the general treatment for fever. The symptoms of local fever or inflammation—heat, redness, pain, and swelling—are common to general fever, but being diffused over a larger surface, may not be so prominent in any part. The pathological condition—congestion—is the same, and therefore the treatment is the same. There are the same indications for the use of cold or evaporating applications to the surface, the same indications for depletion, and the same indications for stimulants, tonics, etc.

The treatment of acute and chronic diseases is the same in kind, though modified in *activity* by the consideration that in chronic cases the vessels have become *habituated*—from duration of congestion—to a state of over-distention, and cannot *suddenly* return to their natural calibre or state upon the sudden removal of pressure. Duration is an element in formation and in cure. Hence we deplete more gradually or slowly in chronic than in acute attacks.

We have seen that fever, and its attendant phenomena, were connected through venous congestion—an increased retrograde pressure of venous blood in the capillaries. Now from the connection of the liver with the venous system, to increase its secretion, is directly to deplete from that system; is directly to diminish the retrograde pressure of venous blood in the capillaries. Hence the popularity of purgative medicines, especially those supposed to increase the secretions of the liver. Why is calomel prescribed for such a multitude of special diseases? How can it be *explained*, except there be a condition, common to all, which the action of calomel sometimes diminishes or removes? Has not every physician seen fever itself, and the attendant phenomena, all diminished or removed at the same time by the action of a mercurial cathartic? Is not this in evidence that they are connected through a common cause? If we take up an advertisement of a popular or patent medicine, do we not see that it is recommended for almost every disease that the body is liable to? There is a significance in these facts which is worthy of consideration.

If we take blood from a vein, or increase the secretion of the

kidneys—the force of the arterial circulation remaining the same—we are still depleting from the venous system. If we continue to deplete after the force of the arterial circulation has declined to a certain point, we abstract from the blood in actual circulation, and will speedily produce the state—congestion—which we are trying to remove. The very remedies necessary to remove congestion, if carried beyond a certain point, produce that state. Unquestionably, many cases of dropsy, and fever, have been relieved by bleeding, by abstinence, and also by increasing secretion; but it is equally true that a man may be bled, or starved, or purged, into a dropsy or fever. Do we not see clearly from this that we are dealing only with relations? *Can any other theory explain these facts?*

As with the diseases and remedies of the natural body, so with those of the body politic. It is only within *certain limits* that human laws (remedies) operate *beneficially*; beyond those limits, they produce the state they were ostensibly enacted to remove. Do not excessive laws defeat themselves? Do not tyrannical laws come back upon their authors, whether those authors be few or many? Let history answer?

Undoubtedly, medical Sangrados have done much harm, have consigned thousands to premature graves; but who can compute the numbers slain by political doctors—legislative Sangrados.

When the pulse is soft and feeble—when a people are exhausted—congestion or disease is better relieved by stimulants, tonics, encouragement, good nursing, and good diet, than by depletion; or if local depletion is necessary in any of these cases, it must go hand in hand with general restoratives.

The effect of the stimulant in these cases is to fill up and increase the force of the pulse; is to throw an additional quantity of blood into the arterial system; which additional quantity of blood must necessarily be derived from the veins; so that stimulants and tonics, as well as depletion, operate, within certain limits, or when acting beneficially, by diminishing venous congestion.

We thus see that though disease be a unit, the treatment must be *adaptive*; adapted to conditions, to degrees, or to diversity as well as to unity.

We have now seen the terms debility, dilatation, congestion and obstruction, connected with the terms reaction, inflammation, fever, and hypertrophy. This reconciliation of terms must recon-

cile the apparently opposite opinions which have so long divided pathologists.

Humoralists and solidists: the advocates of plethora, obstruction, and debility, on the one side, and of increased action, on the other, *meet* in dilatation with hypertrophy of the heart, and are reconciled; meet in the chambers of that organ, and are harmonized.

PATHOLOGICAL PHENOMENA GENERALIZED.

PART II.

It may be said that if all pathological phenomena are produced by congestion—pressure—they should all appear whenever that congestion was *general*, as in dilatation of the heart. If we were to add the phenomena observed and noted by other authors to those recorded by Dr. Hope, the remainder would be small indeed; but we propose to present the argument in a somewhat different form from the preceding, and so nearly exhaust the subject, that any remainder cannot rank above a perturbation.

We are now to employ, more directly, and in form, the Deductive Method: and as a basis, or inductive step, we introduce some experiments, establishing the fact that congestion—pressure—venous congestion, an increased retrograde pressure of venous blood in the capillaries, is the cause of a multitude of pathological phenomena.

“In one rabbit I tied the jugular veins on each side of the neck. When it was at liberty, it ran about, cleaned its face with its paws, and took green food. Its respiration was reduced to sixty-eight inspirations in a minute, which is about half the natural number. After four hours it ran about as if nothing had happened, and eventually recovered.

“When it was killed and injected, I found, on each side, three anastomosing veins, passing from the anterior to the posterior part of the jugular veins, and conveying the blood from the head to the heart.

“In a second rabbit, I tied the jugular veins of the neck as before. The animal's respiration became slow, but it ate green

food, ran about, and was difficult to catch; but for five days after it appeared dull, its ears had dropped. On the seventh day it was seen to be convulsed, and frequently rolled over. Its voluntary powers were lost, as well as its sensation, in a great degree. On this day it died. On examination, a clot of blood was extravasated in the left ventricle of the brain. Hence it follows that apoplexy will occasionally result from an obstruction to the return of blood in the jugular veins; and this I have known to happen from enlargement of the glands in the neck of a boy."—*Sir Astley Cooper's Experiments.*

"The adequacy of venous obstruction to produce dropsy, is well illustrated by some experiments of Lower. He tied the jugular veins of a dog, expecting the animal to die of apoplexy; instead of this result, the face and head of the animal became much swelled with œdema. He then tied the ascending cava; ascites and anasarca of the lower extremities were the result. Disease affords numerous examples of dropsy and flux from venous obstruction."—*Williams' Principles of Med., p. 182.*

"The fact, then, which is beyond dispute, of the frequent præexistence of local engorgement and distention of the capillary circulation, gives support to the hypothesis that, (in certain cases at least,) the issue of blood results from pressure, whereby the blood in substance is urged through passages naturally impermeable by its red particles, but now mechanically dilated in consequence of the *vis-a-tergo*. Although the dilatation cannot be made sensible to the eye, this seems the simplest and most obvious explanation applicable to some forms of idiopathic hemorrhage, and to the secondary species of that which is symptomatic. That blood may be thus exhaled, independently of any disease of the vessels themselves, we know from experiments on animals, and from the observation of what sometimes occurs in the healthy human body. Boerhaave produced hemorrhage into the intestinal canal of a living dog by placing a ligature on the vena porta. An extreme turgescence of the whole venous system is one of the results of sudden strangulation. Dr. Yelloly accordingly found such turgescence conspicuous in the bodies of five criminals who had recently suffered death by hanging; and in two of these instances, blood in considerable quantity had exuded from, and coagulated upon, the mucous membrane of the stomach."—*Watson, Cyclopædia Pract. Med.*

"As if to furnish the *experimentum crucis* in respect to this doctrine, disease does sometimes with a curious precision, dam up one only of the two great venous trunks, at the junction of which the right auricle is placed; and then the dropsy is as curiously limited to that half of the body in which the tributary veins of the obstructed trunk originate. The first example of this which I ever saw was a most remarkable one. The patient was dropsical in his

upper half only. His arms were so hugely anasarcous that he could not bring his elbows near his sides; his neck and face were hideously bloated and exaggerated, and his eyes prominent and staring; while his lower limbs were of their natural size, and appeared preposterously small and out of proportion. The poor man looked as if the upper part of his body had been stuffed, for acting some ridiculous part on the stage. The cause of this strange and distressful state was found to be the obliteration of the vena cava superior, close to the auricle; its sides had been pressed together, by a large aneurism of the aorta; and a portion of the vein was fairly sealed up. I have seen two similar cases since.”—*Watson's Practice*, p. 172.

“A ligature drawn round any part of the body, so as to intercept the communication of the great vessels and the heart, may cause that part to perish. But the effect of the ligature is not the same in all cases; and it does not always produce mortification in the same way. You apply a bandage round the arm before you bleed a patient, to make the veins of the forearm become distended, the object being merely to stop the circulation in the superficial veins. If you take it off at the end of a few minutes, the hand is at once just as it was before the ligature was applied. If you were to leave it on for twelve hours, the whole hand and forearm would become swollen; and would remain swollen for some time after the bandage was removed. The swelling in such a case arises from the congested state of the veins, and from the consequent effusion of some of the serum of the blood into the cellular membrane. If the ligature round the arm be still tighter, so as to obstruct the circulation to a greater extent, but without arresting it altogether, the same effect is produced, namely, serous effusion, which may continue for sometime after the cause which produced it is taken away. The first effect, then, of a ligature which obstructs the circulation without arresting it completely, is to produce serous infiltration of the cellular membrane, and œdematous swelling. The different kinds of dropsy depend on the same principle. Disease of the heart, impeding the circulation through it, gives rise to anasarca of the legs, and dropsy of the pericardium and pleura. Disease of the liver produces dropsy of the peritoneum.

“But let us suppose that a ligature is applied in this manner around the arm, and allowed to remain, so that the impediment continues. A low sort of inflammation is set up, the œdematous swelling and tension are aggravated, and this may terminate in mortification.

“Parts may be killed by pressure. The mode of death here is nearly the same as when parts are killed by ligature. The difference being simply this: the pressure is like a ligature applied to a broad surface, operating not on the arterial and venous trunks, but on all the small vessels and capillaries.”—*Brodie's Lectures*.

“The effects of pressure have often been observed by experi-

ments on animals. If the cranium of a dog is trepanned and pressure performed on the *dura mater* to a certain extent, the animal shows signs of great uneasiness, and is affected with general convulsions; if the pressure is *increased*, the convulsions cease, the breathing becomes stertorous, the animal torpid and comatose; if the pressure is *diminished*, the breathing becomes more free, and the convulsions return; and if it is entirely removed, the animal soon completely recovers. The principal causes of pressure are congestion, effusion, etc.”—*Cyclopedia Pract. Med.*

“I confess that the difficulty is not wholly relieved by these considerations. But it is a difficulty which cannot invalidate the evidence of numerous facts that attest the agency of pressure, as, at least, one cause of coma. The presumption of agency arises whenever coma immediately succeeds to pressure; and it is converted into certainty, if, upon the removal of pressure, the coma immediately departs. Now the annals of physic are full of instances of this kind. In experiments upon animals, stupor has been brought on, and made to cease, at the pleasure of the operator, by applying pressure to the exposed brain, and by remitting that pressure. Nay, the experiment has been tried on the human brain itself. A man who had undergone the operation of trepanning, and had recovered, was in the habit of exhibiting himself for money in Paris, where Haller saw him. He suffered the spectators to make pressure upon his brain, where it was covered by the integuments only. This always put him into a state of coma or deep sleep; but sensibility and the power of voluntary motion returned at once when the pressure was taken off.”—*Watson's Practice*, p. 310.

Connect these experiments with the one performed by nature on the human subject in dilatation or valvular disease of the heart, and we see the multitude of phenomena which are unequivocally produced by congestion—pressure. This much is secure, since we can produce these phenomena, *whenever we will*.

Can they be produced in any other way than through congestion? This state being a *known* cause, it belongs to those who hold that other causes, as blood poisons, etc., may produce them, to bring forward a case or cases in which congestion is *absent*. Metaphysical assumptions or disquisitions will not do here. They must produce a case, or give positive demonstration, in the absence of congestion, or the question is settled in favor of this argument.

In any order of phenomena, if we connect a large number or a majority of them together through a common cause, and then can carry that common cause into the remainder, the question is set-

tled. We have discovered the law, or the invariable relations of succession and similitude, which they bear to each other.

Now we have already connected a majority of pathological phenomena together through congestion, and shall carry that state into the remainder.

The preceding experiments and reasoning lay the foundation of our argument in solid fact; furnish the particulars, or the inductive step, from which to ascend to the general conclusion that *all* pathological phenomena are connected through congestion.

Assuming that all pathological phenomena are produced by congestion, it follows, or we deduce—

1. That all exciting causes of disease produce the state marked by the term congestion.
2. That this state precedes and coëxists with all pathological phenomena more complex than itself.
3. That the treatment of congestion illustrates the treatment of all special diseases.
4. That this state is a constant *post mortem* appearance, whether there be recognized organic change or not.

These deductions verified, and we submit that the argument which sustains Astronomy, does not rest upon more secure foundations—

1. That all exciting causes of disease produce the state marked by the term congestion.

“The causes of congestion are: 1st. Those which act by primarily depressing the organic nervous influence; such as advanced age; the continued or prolonged impression of cold; mental anxiety, and all the depressing passions and moral emotions; prolonged sleep; mental and physical inactivity; miasmatal, contagious, and infectious emanations; various vegetable, animal and gaseous poisons; and the rapid loss of the natural electrical tension of the frame. 2d. Those which mechanically impede the return or the circulation of the blood itself; or which change its quantity or quality, either locally or generally; as excessive heat; general plethora, produced either by too full living, or by the suppression of the natural, or accustomed discharges; interrupted circulation through the heart, the lungs, liver, &c.; a long continued posture by debilitated persons; the use of unnecessary ligatures, and tight lacing; improper and unwholesome food; contamination of the blood by the absorption or introduction into it of noxious, mineral, vegetable, and animal substances, or gaseous fluids; and changes taking place in its constitution, from the interrupted secretion or elimination of hurtful matters from it.

3d. Those causes which exhaust the irritability or vital tone of the vessels, by previously exciting them above their natural state of action.—*Copland's Dictionary*.

Attention is directed to the exhaustive character of the preceding quotation; and its significance is apparent if we reflect that its author was not attempting to sustain any general theory.

This verifies our first deduction.

2. That this state (congestion) precedes and coëxists with all pathological phenomena more complex than itself.

To bring the whole subject clearly into view, we throw it into a form of the syllogism:

All pathological phenomena are produced by pressure; dilatation and hypertrophy of the heart are pathological phenomena; therefore they are produced by pressure.

"The causes of hypertrophy and dilatation are often the same, though acting upon different principles. Whatever stimulates the muscular action of the heart, may produce the former affection; whatever has a tendency to distend the walls, may produce the latter. Now no stimulus is greater, probably, to the muscular fibres than the pressure of the blood within the cavity they surround; and no cause tends more strongly than this to produce distension."—*Wood's Practice*, vol. 2, p. 167.

We have seen that a "relatively increased pressure of blood to the returning pressure of the heart or blood-vessel," was marked by the terms debility, dilatation, congestion, and obstruction.

Increased action is marked by the terms reaction, inflammation; fever, and hypertrophy.

Dilatation, then, is congestion; and hypertrophy, reaction; and as dilatation and hypertrophy are produced by pressure, therefore, congestion and reaction are produced by pressure.

As dilatation with reaction or hypertrophy, and congestion with reaction or inflammation, and debility with reaction or fever, have the same antecedents or cause, and as dilatation and reaction or hypertrophy, are produced by pressure, therefore, congestion with reaction or inflammation, and debility with reaction or fever, are produced by pressure also.

We are now to carry the simple state of congestion into all pathological phenomena; to witness the whole immense variety connected with the terms dilatation, obstruction, debility, and congestion; and through these terms, with pressure. These are the points to which we direct attention.

“Retardation of the flow of blood in the small vessels, coincident with dilatation of their calibre and accumulation, and at last stagnation of the blood corpuscles in the vessels, constitute the first phenomena constantly appreciable by the microscope in the inflammatory process as seen in the frog. The *macroscopical* phenomena of inflammation in man, being similar to those observed in the frog, seem to warrant the inference that the *microscopical* ones also are essentially the same in him as in the frog. The explanation of these phenomena, therefore—their sequence and relations—is justly considered the key of the whole theory of inflammation.

“That the dilatation of the small vessels is primary, and the retardation of the flow of blood in them is secondary—the necessary physical result of the preceding dilatation—is the opinion of most recent authors.”—*Jones Ophthalmic Med.*, p. 50.

“If we wish to advance a step farther and tread in the regions of hypothesis, then it seems a reasonable doctrine that the primary disturbance of the functions of the nervous system acts first on the capillaries or extreme vessels of the surface as well as throughout the internal organs, and produces, not spasm, as was imagined by Hoffman and Cullen, but rather, according to modern views of the state of the capillaries in inflammation, a state of atony, relaxation, and distension, and consequently obstruction to the passage of the blood; that the disturbed state of the circulation is an effort excited by the stimulus of this obstruction for accomplishing its own removal.”—*General Doctrines of Ferri. Trecedie's Library.*

The following quotation illustrates and illuminates the two preceding :

“The physical cause of hypertrophy, in nineteen cases out of twenty, is some obstacle, mechanical or virtual, to the perfect accomplishment of the function of the chamber; some obstruction opposed to the free and thorough exit of the blood from it; or something which hinders the easy play of the organ: hence, in the first place, a gradual yielding, or tendency to yield, in the sides of the affected chamber, from the continued and unwonted pressure of the accumulated blood against it; and in the second place, a *striving* action of the muscle to overcome the hindrance, or to counterbalance the obstacle; and consequently, according to the law formerly announced, an augmentation in the bulk of the muscle whereof the function is thus increased. If the hypertrophy, which is the result of a truly conservative process, keeps pace exactly with the amount of the obstacle, and exactly balances it, no dilatation happens, or next to none. But this is comparatively seldom the case. According to the principles of mechanics, a little distention of the spheroidal cavity must require an increase of force to propel from it a given quantity of blood, in the same time, through a given discharging orifice; so that incipient dilatation becomes (in addition to the supposed obstacle) an efficient cause of hypertrophy; and

the two, the dilatation and the hypertrophy, commonly make progress together."—*Watson's Practice*, p. 661.

"When, from mechanical obstruction or any other cause, blood is inordinately accumulated in the heart, the organ is provoked to extraordinary efforts; it struggles against the obstacle; it frets and labors to overcome it; the coronary arteries are excited to increased activity; augmented nutrition (hypertrophy) ensues."—*Hope*, p 244.

"Whence it appears, that then (in the cold fit) the bloody humors do stagnate at the ends of the capillary vessels, and that there is, notwithstanding, at the same time some cause that irritates the heart." "So that the two quick contraction of the heart, with an increased resistance at the ends of the capillary vessels, is sufficient to complete in us the idea of all acute fevers."—*Boerhaave's Aphorisms*.

"It is, therefore, evident that there are three states which always take place in fever: a state of debility, a state of cold, and a state of heat; and as these three states regularly and constantly succeed each other in the order we have mentioned them, it is presumed that they are in the series of cause and effect with respect to one another. This we hold a matter of fact, even although we should not be able to explain in what manner, or by what mechanical means these states severally produce each other."—*Cullen's First Lines*.

Cullen supposed that spasm of the capillaries connected debility with fever; but we have seen that debility implies venous congestion, and that it was the increased retrograde pressure of venous blood in the capillaries which connected debility with fever.

"His (Brown's) theory differed in no essential respect from Cullen's. 'Like his predecessor,' says Dr. Smith, 'Brown attributes all fevers to debility; and affirms that the distinctions which physicians have made about the differences of fever are without foundation; that they are all the same, differing only in degree.'"—*Clymen on Fever*.

Our own distinguished countryman, Dr. Benjamin Rush, advocated the unity of disease, and maintained that debility was the only predisposing cause.

"The terminations and consequences of debility are (a) impeded or interrupted secretion; (b) changes of the circulating fluids; (c) various states of irritation or inflammatory action in particular organs or tissues; (d) general reaction of the vascular system associated with various grades of vital power, from the lowest or most asthenic, to its highest or most sthenic form, with

their modifications: (*e*) changes in the firmness, elasticity, nutrition, color, form, and vital cohesion of the soft solids, and, in some instances, ultimately in the hard solids also; (*f*) effusion of fluids—aqueous, serous, sanguineous, &c.—from mucous or serous surfaces, or in cellular or parenchymatous structures; (*g*) the formation of new or adventitious tissues or productions, as tubercles, tumors, melanosis, cancer, hydatids, worms, gangrene, &c.; and (*i*) lastly, death.”—*Copland's Dictionary*, vol. 1, p. 555.

“The most impressive illustration of the debility connected with internal congestion, and of the effect of copious blood-letting in relieving it, is, perhaps, that which is furnished by the epidemic, or, as it is commonly termed, spasmodic cholera. In the pamphlet published by the London General Board of Health, by authority of the Privy Council, the following passage occurs: ‘But the remedy which is described to have been most uniformly successful, when it could be used, is bleeding, and this even in cases where the pulse was scarcely perceptible at the wrist. This practice seemed to apply itself to the root of the disease, by relieving the congestion of the venous system, which was invariably found loaded on examination after death, and which congestion (though only an effect of of the first impression made by the attack of the disease on the constitution,) appeared to be the immediate cause of death. In the lighter cases, or in those of a severe nature which came under medical treatment before the pulse at the wrist was lost, or had become fluttering, bleeding was attended with the most decided advantage. The oppression of the chest, the burning heat of the præcordia, the spasms, the vomiting and purging, are stated in some instances to have ceased at once; in others, on a repetition of bleeding. In such as allowed a free abstraction of blood, these effects very uniformly occurred; but even in some, when the pulse was indistinct, bleeding was successful, if it could be carried to the extent of eighteen, twenty-four, or thirty ounces, the pulse rising in power and becoming more distinguishable in proportion to the flow of blood. If the pulse in this state of feebleness was distinct enough to give the finger the feeling of oppression, bleeding was almost always successful. The blood drawn was black, whether procured from a vein or an artery, and flowed with great difficulty, commonly first coming from the vein in drops, and gradually in a stream; but before it could be induced to flow with freedom the patient often required warm baths, frictions, external and internal stimuli, to produce a sufficient quantity for his relief. If a small quantity only could be procured, the heart seemed to feel the loss without being relieved, the bulk of the blood actually circulating being reduced, while the great mass of it, congested in the inferior and superior vena cava, did not make its way to the heart. The effect of bleeding was mechanical, and acted only as removing an obstruction to the passage of the blood from the distended venous system; and if not carried far enough to remove this impediment

and allow the large veins to empty themselves into the heart, such weakness was produced as is occasioned by the loss of blood in a constitution worn out by disease.”—*Art. Plethora. Cyclopaedia Pract. Med.*

“It is reasonable to believe that the remote causes of phthisis, however variously they may appear to operate, do so by inducing some peculiar or determinate derangement of the system—some positive pathological condition, which, being *constantly* present wherever tuberculous disease is found, may be regarded as necessary to its production. Although we hesitate not to say, that, in the actual state of our physiological and pathological knowledge, we are unable to define with certainty *all* the conditions in which tuberculous disease has its origin, we think it would not be difficult to point out some of the more important links of the chain which connects special functional disorder with the formation of tuberculous cachexia. On some future occasion we may take an opportunity to enter more fully upon the subject; our limits at present merely permit us to call the attention of the reader to that morbid condition which, in our minds, constitutes the most obvious and important in a practical point of view.

“A congestive state of the venous system of the abdomen is the condition to which we refer; it is one which was familiar to the pathologists of the last century, and, although it has not been quite overlooked, it has been too much neglected by the moderns. Such of our readers as are familiar with the writings of the German physicians of the middle of the last century, particularly Stahl, Hoffman, and above all Kaempf, and his disciples, will be aware of the extensive influence and importance attached to this state of the abdominal circulation at that time. Referring to those works where the facts upon which the doctrine rests are fully exposed, we shall restrict ourselves here to a few observations more particularly bearing upon the subject of this article, and which it is but justice to ourselves to say were established in our mind as the result of practical observation, before we were aware of the existence of the German doctrines of abdominal infarctus.

“In children originally of a strumous habit, we observe a constant disposition to this congestive state of the abdominal circulation; and unless we succeed in obviating it, they become tuberculous and die early in life. In youth we find the same state of congestion as a precursor of tuberculous cachexia; but it is during the middle period of life, from thirty-five to forty, that it is accompanied with more marked symptoms, such as dyspepsia with its various concomitants, which exist often for a very considerable time, and not unfrequently obscure the pulmonary affection till tuberculous disease has made considerable progress. This is the form of the affection which has been denominated *dyspeptic phthisis*; and if the term referred merely to the cause of the pulmonary disease, there would be little harm in retaining it; but if used to

designate a species of phthisis differing from the tubercular, we consider it decidedly objectionable; because, however prominent the dyspeptic symptoms may be, tubercular disease of the lungs is the cause of death. While we admit to the fullest extent the necessity of attention to the state of the digestive organs, we must object to the pathological view which limits the attention of the practitioner to the dyspeptic affection, neglecting other and equally essential parts of the treatment. We do not know such a disease as dyspeptic phthisis as constituting a particular species; but we are well acquainted with that form of tubercular phthisis which is long preceded and accompanied in its progress with dyspepsia. Indeed, tubercular phthisis rarely occurs in the middle period of life without this complication; but it cannot be doubted that the deranged condition of the digestive organs is, in these cases, very often a mere consequence of a long preëxisting state of congestion of the venous system of the abdomen; and which, if not corrected by more efficient measures than those generally applied to relieve the dyspeptic symptoms, may soon terminate in pulmonary consumption. The profession are highly indebted to Dr. Wilson Philip, for calling their attention to the congestive state of the hepatic system, and pointing out some of the most effectual means of obviating it, but we cannot admit that this dyspeptic phthisis differs in its nature from common tubercular phthisis.

* The effects of congestion and derangement of the abdominal viscera have long been remarked as causes of phthisis; they were regarded by Kæmper and his disciples as giving rise to most of the chronic diseases of the chest. Portal observes, that it is certain that engorgement of the liver and other affections which derange the secretion and even excretion of bile, may become a cause of pulmonary phthisis; and several other authors have remarked the connection of phthisis with abdominal disease, but in a manner so vague and undefined as to attract little attention.

* Abdominal plethora, when once established, gives rise to a series of deranged functions in the digestive organs, the lungs, skin, &c., which by impeding digestion and assimilation affect the whole animal economy. These are manifested in imperfect biliary secretion, constipated bowels, and irritated mucous surfaces, in congestion of the lungs, and a dry and harsh state of the skin. In consequence of the over-loaded condition of the venous system, the heart, generally feeble in the tuberculous constitution, is oppressed, and the arterial circulation impeded and enfeebled. In this state of the system, very slight exciting causes induce disease, inflammation and hemorrhage; hence arises the constant liability of strumous subjects to inflammatory diseases of a sub-acute or chronic character, and hence also we derive an explanation of the hemorrhages to which they are peculiarly liable even at a very early age. The same pathological state of the abdominal circulation forms the remote cause of the various congestive and chronic

diseases so common in the strumous subject; such as glandular swellings, cutaneous eruptions, &c., &c."—*Art. Tubercular Phthisis, by Sir James Clark. Cyclopaedia Pract. Med.*

"It may be said, generally, that when congestion is constant in a cavity, dilatation is more commonly the result; and that when there is only resistance to the expulsion of the blood without constant engorgement of the cavity, it is more common for hypertrophy to be produced. Contraction, for instance, of the aortic orifice causes hypertrophy of the left ventricle in a greater degree than dilatation; whereas patescence of that orifice, attended with regurgitation and constant congestion of the cavity, causes dilatation in a greater degree than hypertrophy."—*Hope on the Heart, p. 252.*

"The sequelæ of hyperæmia are multiplex, varying with the duration, the repetition, the degree of congestion. Much likewise depends upon the character of the affected organ, the congestion being significant in proportion to the general importance of such organ, and the vulnerability of its texture. Organs are prone to congestion proportionate to their vascularity and to the degree of their functional activity. Under particular circumstances of life, of occupation, of civilization, certain organs, such as the brain and its membranes, and the lungs, are hardly ever entirely free from congestion. Congestion affects morbid growths equally with normal formations.

"Intense congestion suddenly developed in organs essential to life (the brain or lungs) may prove fatal directly, as so-called vascular apoplexy, or the sudden effusion of blood serum into the textures—acute œdema.

"High degrees of congestion occasion laceration of capillaries, and parenchymatous hemorrhage (apoplexy with bloody extravasation) in the brain, the lungs, and other organs.

"The same causes lead, by an over-loading of blood vessels, to absolute palsy of the blood vessels, to stasis, inflammation, and gangrene.

"Moderate but habitual or repeated congestion gradually engenders œdema and the dropsy of serous cavities—genuine dropsy, increased exudation of blood plasma, preternatural nutrition of the textures—hypertrophy, augmented secretion.

"In this relation, abiding mechanical congestions, from heart disease, are worthy of especial notice, with their unfailing consequences—hypertrophy of the glandular abdominal viscera; preternatural secretion of the intestinal and bronchial mucous membranes; excessive, saturated secretion of bile.

"Hyperæmia create and bequeath permanent dilatation and elongation with coil-like or serpentine deflection—properly termed varicosity—of the blood vessels, as more particularly exemplified in the less resinent veins.

“Hyperæmia frequently occasion and obviously accompany the development of various heterologous growths. Finally, in some organs, a proportion of blood-pigment, effused with the plasma, constitute the basis of rust-colored, slate-grey, bluish-black coloration, as in the lungs, or on the intestinal mucous membrane.

“Organs attacked by a high degree of congestion present different shades of dark red, become swollen, loosened in texture, and consequently friable, lacerable.”—*Rokitansky's Pathological Anatomy.*

“When a congestion is extensive it has constitutional as well as local effects. In proportion as blood accumulates in a part, it leaves the rest of the body with less than its proper share, and the limbs and surface generally may show various symptoms of weak circulation and want of blood. Thus with considerable congestion of the lungs, liver or brain, the surface is pallid and chilly, the pulse weak and small, the extremities cold, there is a peculiar feeling of languor or weariness, and all the functions are indifferently performed. Such an effect on the system may be produced artificially by applying a tight bandage around both thighs at once, or even both arms in a weak person: the limbs beyond the ligature become congested, leaving a deficiency of blood in the rest of the system. The extreme of this condition is the cold fit of an ague, in which extensive internal congestions are the most essential pathological change.

“As in this example, so with other extensive congestions, more especially if suddenly induced, as by cold, a reaction may ensue, causing quickened pulse and circulation, hot skin, and other phenomena of fever. Where this reaction is vigorous, it may fulfil its object in sweeping back the congested blood into the circulation, and thus restoring the balance. Where the reaction is weak, it will fail to remove the congestion, but constitutes a low feverish excitement, often remittent in type, with depraved functions, foul tongue, impaired excretions, restless nights, etc., which may proceed for an indefinite period, until a critical evacuation by sweat, urine, or diarrhœa terminates it, and with it sometimes the congestion which has induced it.”—*Williams' Principles.*

“In the present lecture I propose sketching for you the chief changes which occur in inflammatory effusions; those changes at least which lead to suppuration, or to chronic thickening in organs.

“I must begin by carrying you back to the subject of my last lecture, and by reminding you of what occurs when the capillary blood-vessels are overloaded with blood. I stated to you that, under these circumstances, the capillaries suffer a certain proportion of their fluid contents to exude. I stated likewise that they changed this fluid as it exuded, and that the change thus accomplished (which distinguishes the serous fluid in question from the plasma of the blood) will vary, according as the pressure which

drives it through is little or much above the healthy and normal pressure of the circulation. If the pressure be very slightly in excess, the material which transudes is a weaker solution of the salts of the blood with a trace of albumen; as the pressure increases, the proportion of albumen becomes larger; at length fibrin is found, perhaps only in flakes: a stage further, and it becomes sufficiently plentiful to impart to the transuded material the property of spontaneous coagulation; and finally, the pressure may be such as to cause the rupture of the capillary vessels, and impart to the effusion a more or less admixture of blood-corpuscles.

“These various degrees are well illustrated in the pathological history of the kidney. If you have congestion of that organ induced, either by interference with its escaping blood, or by too much impulse in that which goes to it, an increased exhalation occurs into the tubules, and you get the symptom called albuminuria—one precisely analagous in its mode of production to that of ordinary serous effusion in the cellular tissue of the body. If the disease advance, the malpighian tufts pour out not only serum, but fibrin; and in this stage, if you examine the urine microscopically, you find this fibrin in the shape of little threads: these are accurate casts of the minute urinary tubules into which the fibrin was originally poured, and from which it brings down, entangled in its substance, a certain quantity of the cell-growth of the tubule, the epithelium or endothelium. Finally, go a stage further, and instead of seeing these little threads transparent, colorless, and of pure fibrin, you see a quantity of blood-corpuscles entangled in them; the capillaries of the malpighian tufts have broken with the pressure, and have let all the elements of their blood escape: so that, instead of getting a mere fibrinous mould of the microscopical tubule, you get its little mould made of a thread of coagulated blood. These changes exactly illustrate the history of congestive and inflammatory effusions in all organs of the body; and as the kidney is peculiarly liable to such diseases—diseases, moreover, which are of the utmost interest and importance—you can hardly select a more convenient organ for exhibiting the changes in question.”—*Simon's General Pathology*.

A comparison of the preceding quotations will show that the same phenomena are ascribed to dilatation, obstruction, debility, and congestion as the cause. This, we submit, connects them together; connects—through pressure—the theories founded upon them. Volumes of similar extracts might be adduced did repetition beyond a certain point add to the weight of testimony.

We will now carry the thread of congestion through the diseases of the nervous system.

“CONGESTIVE DISORDERS OF THE NERVOUS SYSTEM.—I have previously pointed out the peculiar nature of the circulation

within the cranium and vertebral canal, and shown that, although well defended under ordinary circumstances against any mischievous change, still when such change does occur it operates in a peculiar manner. In other words, as long as the bones are capable of resisting atmospheric pressure, although the amount of fluid within these cavities cannot change as a whole, yet the distribution of that amount may vary infinitely. Thus by its being accumulated sometimes in the arteries, at other times in the veins, or now in one place, and then in another, unaccustomed pressure may be exercised on different parts of the nervous centres. This, according to its amount, may either irritate or suspend the functions of the parts, a fact proved by direct experiment, as well as by innumerable instances, where depression of bone has caused nervous phenomena, which have disappeared on removal of the exciting cause. That congestion does frequently occur in the brain and spinal cord, there can be no doubt, although it cannot always be demonstrated after death. The tonic contraction of the arteries is alone sufficient to empty them of their contents, and turgidity of the veins may or may not remain according to the symptoms immediately preceding death, and the position in which the body is placed. But it is observable that every cause which excites or diminishes the action of the heart and general powers of the body, are at the same time those which induce nervous disturbance, as well as occasion a change of circulation in the cerebro-spinal centres—such as the emotions and passions, plethora, and anemia, unaccustomed stimuli, uterine derangement, etc., etc.

“It is *only* by this theory that we can understand how such various results occasionally occur from apparently the *same cause*, and again how what appear to be *different causes* produce *similar effects*. Thus violent anger, or an unaccustomed stimulus may, in a healthy person, induce a flushed countenance, increased action of the heart, a bounding pulse, and sudden loss of consciousness. Again, fear or exhaustion may occasion a pallid face, depressed or scarcely perceptible heart's action, feeble pulse, and also loss of consciousness. In the first case, or coma, there is an accumulation of blood in the arteries and arterial capillaries, and a corresponding compression of the veins; in the second case, or syncope, there is distension of the veins and venous capillaries, with proportional diminution of the calibre of the arteries. In *either* case, owing to the peculiarity of the circulation within the cranium, *pressure is exerted on the brain*. Hence syncope differs from coma only in the extreme feebleness of the heart's action, the cause, producing loss of consciousness, sensation, and voluntary action, being the same in both. Indeed it is sometimes difficult to distinguish these states from each other, and that they have been frequently confounded does not admit of doubt.

“In the same manner, partial congestions from either cause may occur in one hemisphere, or part of a hemisphere, in the brain, or in any particular portion or segment of the spinal cord. The

pressure so occasioned may irritate and excite function, or may paralyze or suspend it: nay, it may so operate as to suspend the function of one part of the nervous system, while it exalts that of another. Thus all the phenomena of epilepsy are eminently congestive, the individual frequently enjoying the most perfect health in the intervals of the attack, although the effects are for the time terrible, causing such pressure that, while the cerebral functions are for a time annihilated, the spinal ones are violently excited. In the same manner are explained all the varied phenomena of hysteria and spinal irritation, for inasmuch as the spinal cord furnishes, directly or indirectly, nerves to every organ of the body, so congestion of this or that portion of it may increase, pervert, or diminish the functions of the nerves it gives off, and the organs which they supply. Congestion, therefore, we conceive to be chief cause of functional nervous disorders originating in the great cerebro-spinal centre."—*Bennett's Clinical Lectures*, pp. 403-5.

"The cases which have just now been reported, have shown the principal forms symptomatic of hyperæmia of the cerebral hemispheres. On combining with those few cases which ended in death several others of the same kind which terminated favorably, we have been led to the inference that cerebral congestion may present itself to us in one of the eight following forms:

"The first form is characterized principally by dizziness of greater or less intensity: the patients may be affected at the same time with pain of the head, dizziness, *tinnitus aurium*, momentary aberrations of vision, temporary embarrassment in speech, a sense of formication in the limbs, and sometimes at the face. The countenance is generally flushed, eyes injected, pulse in general not frequent, and of variable strength. This state may last for some moments, or some hours; but it may also be prolonged for several months, or may continue even for several years. In some persons it shows itself but once; in others it reappears at intervals more or less remote. We have seen a man fifty-nine years of age, who, for the last thirty years, had not passed a single day without having in different degrees one or other of the symptoms mentioned in the preceding paragraph. Another person had experienced them from the age of thirty years till he was thirty-four. He then became completely freed from it till the age of forty-eight, at which time he was again attacked with violent dizziness. We noticed the case of several persons in whom every year, nearly in the same month, these attacks of dizziness reappeared. In some females they manifest themselves at the return of each menstrual period.

"After this dizziness has lasted a shorter or longer time, it may happen that they attain all at once such an intensity as to be changed into a sudden loss of consciousness; but the latter may likewise supervene without having been preceded by dizziness. It is this sudden loss of consciousness, with or without preceding dizziness, which characterizes the second form of cerebral conges-

tion. In this form the patients fall to the ground, deprived suddenly of all understanding, sensation, and motion; but if their limbs be raised, they do not fall back again by their own weight, and some patients can sustain them in the air. There is not then, properly speaking, any paralysis. They may remain in this state from some minutes up to twenty-four or thirty hours: then they come to themselves, and are quickly restored, without any lesion either of sensation or motion remaining. Others, after having come to themselves, retain for some days a little difficulty in the performance of some of the functions of the life of relation. Thus their speech is embarrassed, or their different movements are difficult.

“At the same time that the patients fall, deprived of consciousness, they may be struck with paralysis, either general or confined to only one side of the body. This is the third form of cerebral congestion. But almost at the same time that the loss of consciousness disappears, the paralysis is also seen to disappear, so that cerebral hemorrhage cannot be admitted to have taken place in this case. The cases we have cited prove the possibility of this paralysis *without* any effusion of blood having taken place into the brain. Instead of general or partial suspension of motion, this function may be performed in a manner disorderly and irregular, and without any participation of the will. Then at the same time that there is loss of consciousness, there are observed either different convulsive movements or permanent contraction of a certain number of muscles; all these symptoms last at the utmost for some hours, they then disappear without leaving any trace behind. This constitutes the fourth form of cerebral congestion. In a fifth form there is no longer loss of consciousness—it is paralysis that comes on at the very first, sometimes limited to certain muscles of the face, sometimes extend to the entire of one side of the body. This paralysis disappears very promptly, oftentimes a few hours after having commenced; and from this circumstance it is not to be presumed that it is connected with a hemorrhage or softening. Our fourth case actually proves the contrary. The course of this paralysis was very remarkable in the following case: A middle-aged man, working in the quarries near Paris, was suddenly seized, on finishing his dinner, with numbness of the right hand; an hour after the entire upper extremity was totally deprived of motion; no pain is felt in it, nor does he complain of his head. At five o'clock in the evening he had a sense of formication in the right foot; soon the power of motion was equally lost in the lower extremity of the right side; he entered the hospital *Cochin*. On the following morning the hemiplegia of the right side was complete; the sensibility of the paralysed limbs was still retained; he cannot move the right cheek, and when he speaks the left commissure of the lips is drawn up; the direction of the tongue is straight; intellect perfect; he feels a numbness (this is his own expression) towards the frontal region; he was bled to sixteen ounces. In the

course of the day he was able to make some slight motion with the extremities of the right side. On the following morning there was no trace of paralysis. This certainly is not the way in which the effects of cerebral hemorrhage disappear, or of any lesion affecting the interior of the nervous mass.

"The sixth form of cerebral congestion is characterized by the sudden appearance of convulsive movements, partial or general, without preceding loss of consciousness. These movements promptly disappear, without leaving any trace behind them. They may also come on after the persons have experienced attacks of giddiness for a shorter or longer time, and the latter may even survive them. In a seventh form the cerebral congestion no longer produces coma; it no longer exercises any perceptible influence on the movements; the intellect is the function here especially disturbed; violent delirium is observed, accompanied with great development of muscular strength; most frequently, sometime before death, the delirium is replaced by a state of coma, which becomes more and more profound. However, we have ourselves seen cases in which, up to the moment of death, the patients retained great agitation of the limbs and ceased not to speak and vociferate. The most remarkable case of this kind which we met was that of a middle-aged man who for several hours uttered incessantly cries so loud as to disturb the rest of the entire ward. Suddenly he was no longer heard; when we approached his bed he was dead. A thunderbolt could not have struck him more promptly. On opening the body no other lesion was detected except considerable injection of the nervous mass. We shall now notice the eighth form of cerebral congestion, of which our fifth case presents us an example. In this form we see continued fever appear at the commencement, during which those symptoms principally predominate, which appertain to the first form of cerebral congestion already described. We particularly observed this form in some young soldiers who were admitted in considerable numbers into our wards in *La Pitie*, in the beginning of the summer 1831. After laborious exercise several of these soldiers were seized with violent pains of the head, vertigo, ringing of the ears; some even fell suddenly deprived of consciousness, and on coming to themselves they remained with the symptoms above detailed. On entering our wards a little after the attack of their malady they presented to us the following state: Face red, eyes injected and moistened with tears; ringing of the ears, vertigo; great dizziness, which prevented them from standing erect without being threatened with falling; frequent epistaxis; general debility; continued tendency to sleep; pulse strong and frequent; skin hot; no appreciable alteration with respect to the digestive and respiratory organs. This group of symptoms lasted from between three to twelve days. Almost all of them were bled. Some were merely subjected to diluent drinks. By degrees the fever lessened according as the symptoms of cerebral congestion disappeared. No doubt

it was not demonstrated that all the disease in these cases was in the brain; perhaps there existed only mere general over-excitement, in which this organ participated. But the prevailing symptoms were *always* those of cerebral congestion, and, on the removal of the fever, these were the only symptoms observed, and the only therapeutic indication was to combat them. None of these cases terminated fatally. In one patient only there was momentary delirium; in others the attacks of dizziness were for some days so violent that we dreaded that they should terminate in apoplexy.”—*Andral's Medical Clinic.*

“Neuralgia is so intimately related to palsy and apoplexy as to entitle it to have been viewed as the not infrequent antecedent and concomitant of these maladies, and to have been considered as one of their most important complications. But it is equally allied with other maladies, as with epilepsy, coma, and convulsions; and it, in common with those and with the several states of palsy and apoplexy, depends upon a variety of organic lesions of the brain, or of its envelopes, or of the spinal cord and its membranes, which lesions, according to their seat, grade and nature, occasion either of these maladies—the *same lesion even*, according to its seat and development, producing either or even all of them in succession, and after indefinite periods, or even intervals or intermissions. A tubercle or tumour of any kind, for instance, may first occasion neuralgia or epilepsy, or neuralgia following epilepsy, or convulsions, and successively partial palsy, hemiplegia, and ultimately apoplexy, or profound coma, or asphyxia.”—*Copland on Palsy and Apoplexy.*

“There is a manifest connection between hysteria, catalepsy, palsy, and apoplexy. * * * Although these diseases are so different as to render them nosologically distinct, yet they all, with the addition of chorea, convulsions, and even insanity, comprising puerperal mania and convulsions, present a more or less intimate pathological relation in respect both of their physiological pathology and of their organic changes.”—*Ibid*, p. 186.

“Apoplexy, long as this term has been familiar to the profession, still conveys a very indefinite meaning. Some authors use it to distinguish a particular class of symptoms and effects of disease; others to distinguish the pathological condition which gives rise to the symptoms. I think it is applied too generally to the effects of disease instead of the cause. The classification of diseases of the brain which I have adopted is founded on pathology, not on symptomatology. I propose using it to designate pressure on the brain or encephalon, produced by extravasation of blood or serum, or by distension of the vessels without extravasation, such extravasation not being the result of violence, as a blow upon the head. Whenever I employ the term apoplexy, I use it as synonymous with cerebral pressure, and I believe that all its varieties depend on the

amount of the effusion and the part of encephalon injured.”—*Solly on the Brain*.

“The difference between augmented flow of blood along the arteries and its impeded return by the veins, on the intermediate blood channels and organs, is extreme.

“The most violent exercise, as in running, the respiration being free and proportionally accelerated, only suffuses the face with florid blood freely circulating; violent effort, on the contrary, as in lifting, in which respiration is arrested by closure of the larynx, induces a purple tumefaction of the tissues of the face and neck, from impeded flow and stagnation of venous blood. It is the difference between augmented and impeded circulation.

“There is a great difference, too, between the degrees of impediment to the return of venous blood: the violent efforts in ordinary vomiting, fits of coughing, etc., fill the tissues of the face with venous blood; but still more violent acts of vomiting, the efforts of parturition, the convulsions of epilepsy, actually cause the thin parietes of the blood-channels of the face to yield, and induce minute ecchymosis, seen in the eyelids and on the temples.

“Let the impediment to the reflux of venous blood be greater still, and more specifically of the veins of the neck, and we cannot be surprised at the occurrence of loss of consciousness—cerebral epilepsy, if transient, apoplexy, if more permanent, with or without cerebral ecchymosis. A tumor, a ligature, or spasmodic action of the muscles, compressing the veins of the neck, produces this effect.”

“It seems probable that the mere pressure of the veins of the neck may sometimes be partial—greater on one side of the neck, or on one vessel, than the other, or others; and that in this manner partial congestion may occur, and induce more or less temporary hemiplegiac paralysis. One patient, the subject of epilepsy, had, in the first instance, attacks of transient hemiplegia! In like manner the epileptic seizure frequently affects on one side more than the other; and the apoplectic is frequently conjoined with more or less of partial convulsive affection—so *allied* are these diseases.

“The influence of indigestible, and therefore of irritating food, of constipation, as causing of sleep especially, and of posture, and of repletion of the stomach and bowels as augmenting this venous congestion, is obvious to every one.”—*Marshal Hall, London Lancet, Aug., 1848*.

The preceding quotations are so exhaustive, and so high in evidence from the experience and ability of their authors that it is not deemed necessary to introduce additional testimony under the present head.

Those extracts have passed in review before us the long list of

special diseases, and it has appeared that the simple state of Congestion was *common to all*.

This, we submit, verifies our second deduction—unravels the complicated web of pathological phenomena, and shows their continuity unbroken, their connection complete.

Our third deduction is—

3. That the treatment of congestion, illustrates the treatment of all special diseases.

Our deductions support each other. If congestion is common to all pathological phenomena, it follows that the treatment of this state should illustrate the treatment of all.

“REMEDIES FOR CONGESTION.—The most important means in the removal of congestions are those which contribute to the removal of their causes. Thus the loosening of a ligature, or the reduction of a tumor, compressing veins—the moderating the inordinate and inefficient action of a diseased heart—the restoration of the secretion of the liver—will severally tend to diminish the congestions resulting from these different causes of venous obstruction.

“So, also, in the treatment of congestion from atony or weakness of the capillaries, it is important to remove the circumstances which have caused this atony. In many cases it is over-distention from gravitation; here change of posture gives relief. Thus, in congestive fevers, and other states of continued weakness, it is useful to change from time to time the position of the patient from supine to prone, or lying on either side. With congestion of the head, this part should be supported high. The recumbent posture gives much relief to congested hemorrhoidal or uterine vessels, as we see it reduce the swelling of varicose limbs.

“Pressure is sometimes a remedy for congestion, by supporting the weak vessels, and promoting their contraction. This forms a chief part of the useful operation of bandages, adhesive plasters, and even of poultices, in various external congestions. It probably might be more extensively applied to these, and even to some internal congestions, in the modes suggested by Dr. Arnott, by mercury, or by the soft slack air-cushion pad.

“Friction is a modification of pressure especially suitable to some forms of congestion, being calculated to give the motion that is defective, as well as to support the weak vessels. It is obviously useful in external congestions, from cold; and sometimes in visceral congestions, as those of the liver and abdomen generally. Exercise operates somewhat in the same way.

“Another class of remedies for congestion comprehends those which promote the contraction of the dilated vessels by augmenting their contractility or tone. In this way, astringents and cold operate; as in the use of solutions of alum, sulphates of zinc or copper, acetates of zinc or lead, and infusion or decoction of oak bark,

catechu, kino, nut galls, &c., in various congestions, particularly of the conjunctiva, throat, rectum, and vagina. The most obvious part of the action of bark, quinine, and arsenic, in the cure of ague, is in their reducing the great visceral congestions, which form their most remarkable, and perhaps their most important, pathological element.

“The utility of astringents in congestion is limited by the fact, visible under the microscope, that they commonly contract the arteries more in proportion than the capillaries and veins, which are most distended. Hence they may still further impair the motion of the blood, and increase the congestion. A reaction, however, sometimes occurs, which converts the operation of the astringent into that of a stimulant, which is another kind of remedy for congestion. The same remark is applicable to cold; and even more so, inasmuch as it also causes a physical obstruction to the flow of blood, in the manner formerly described.

“Stimulants sometimes are remarkably effectual in removing congestions. Thus, diluted spirit lotion to a congested conjunctiva, capsicum gargle to a congested throat, a stimulating wash or ointment to a purple sore or surface, will often signally reduce the congestion. Other congestions are removed by exciting the circulation generally; a stimulant draught, or even one of any hot liquid, relieves the pulmonary congestion which has induced a fit of asthma; a congestive headache is sometimes mitigated by similar means. Well regulated exercise tends to disperse congestions in various parts. Various agents which specifically excite particular organs or parts, are often useful in removing congestions from them. Thus mercury is, in some cases, a remedy for a congested liver; some diuretics, as digitalis and cantharides, for congested kidneys; squill, benzoin, and other expectorants, for bronchial congestion.

“The influence of stimulants on congestion may be illustrated by the microscope. A solution of capsicum applied to a frog's web, congested after previous irritation, causes an enlargement of the arteries, and an increased flow of blood to and through the congested vessels. This flow restores motion where it was deficient, sweeps away the accumulated blood, and, in some instances, causes the vessels to contract afterwards to their natural size; so that the congestion is completely removed; in that case, the cure is complete. In other instances, however, the stimulants fail to clear the congested vessels; the enlarged arteries pour in more blood; but this not overcoming the obstruction, increases the hyperæmia, and, as we shall afterwards see, may convert it into inflammation. Thus it appears that stimulants as well as astringents, although occasionally proving remedies for congestion, sometimes tend to increase it; and this they are most likely to do when the congestion is extensive, or of long continuance, or when its causes are still in operation.

“Under such circumstances, congestion is better relieved by another class of remedies, *depletion*, and various evacuents. Blood-letting, by puncture or incision in the congested parts, enables the

distended vessels to unload themselves, and they may recover their size; and the utility of this expedient is shown in scarifications of congested conjunctiva, and tonsils, and leeches to a congested os-uteri. But the blood is more usually drawn from the vicinity of the congested part, as by cupping, or leeches to the chest or side for congested lungs or liver; to the sacrum for congested uterus; or leeches to the arms for congested intestines. Or, without actually shedding blood, it may be drawn away from the congested part by derivation; that is, by agents which cause determination of blood or congestion in other parts; as dry cupping, mustard plasters, and other stimulating applications to the surface, and by purgatives and other evacuants from the interior. A still more powerful agency of the class of derivants is that of removing atmospheric pressure from a limb by enclosing it in an air-tight vessel and partially exhausting the air. This was invented by Dr. Arnott, and has been lately employed by Sir James Murray, and several French practitioners. These act by inducing determination of blood, or even inflammation in another part, and thereby drawing away from the congested parts. Some means, however, may be employed which prevent or remove congestion by damming up the blood in other parts, and thus inducing a counter-congestion. It has long been practiced with success to stop a fit of ague by applying a tourniquet to the thigh. Dr. Buckler, of Baltimore, following a popular practice of a similar kind, has called the attention of the profession to the general utility of the remedial measures which he terms *hæmotase*; which consists in the temporary application of ligatures to one or more limbs, which are thereby so much congested, that there is not blood left in the circulation sufficient to supply the congested vessels, and these, relieved of pressure, may contract and expel the accumulated blood. I have employed this plan in several cases in which temporary congestions were produced in the liver and lungs, and sometimes with a very remarkable preventive effect; but it has little influence on congestions which have long been formed, and acts chiefly on the distribution of blood in the larger blood vessels.

"The operation of several of the foregoing agents, in combination or succession, is generally more effectual than that of single ones in the cure of congestions. Thus congestion of the liver may resist the action of mercury, and may even be aggravated by it, until the vascular distention has been partially reduced by local blood-letting or derivants; then the mercury, by increasing the secretion, reduces the remaining congestion. Congestion of the kidneys is augmented rather than diminished by diuretics, which then fail to increase the secretion of urine, but may only render it more albuminous. But after some relief has been given by cupping to the loins, and hydragogue purgatives and diaphoretics, then some diuretics, particularly digitalis and cantharides, cause a freer flow of urine with less albumen. The same point might be further exemplified: but it is unnecessary to multiply instances.

"The cause of congestion being, in many instances, atony of the vessels, it may often be counteracted by circumstances which augment the tone of the vessels, locally or generally. Thus cold, astringent, or, occasionally stimulant applications, by bracing the fibres and invigorating the circulation in a part, render it less liable to congestion from disease; and general tonic measures operate in a similar way on the whole system. The efficacy of bark and arsenic in preventing, as well as in removing the congestions of ague, probably depends on their power of augmenting the tone of the vessels of these parts, so that they no longer yield to the distensive accumulation of blood within them. A similar virtue seems to be possessed by iodine and its preparations, especially the iodide of potassium; under the use of which the disposition to local congestions is diminished, and those formed are sometimes dispersed, as exemplified by the external use of iodine in lepra and other congestions of the skin, and of iodide of potassium in congestive headache. Mineral acids and other tonics have a like effect in cases of general weakness. The treatment calculated to relieve the results of congestion will be considered under the subjects, hemorrhage, flux, dropsy, and inflammation."—*Williams' Principles of Medicine*, pp. 162-165.

To fully appreciate the exhaustive character of the preceding quotation, we have only to take the treatment therein detailed for congestion, *from* the treatment of any special disease, as inflammation, fever, flux, hemorrhage, dropsy, etc., etc., and *look for the remainder*.

The scientific significance and power of this elimination appears in the fact that Dr. Williams was not *attempting* to support any general theory—was not attempting to exhaust the treatment of all special diseases, and yet has scarcely left a *residue*.

Assuredly, taken in connection with what has gone before, this amounts to a demonstration of the truth of our argument.

We see in that quotation the *point of agreement* in all remedial appliances—they all *tend* to remove congestion.

This verifies our third deduction.

Our fourth deduction is—

4. That the state marked by the term congestion, is a constant *post mortem* appearance, whether there be recognized organic change or not.

This last deduction is universally admitted—congestion—venous congestion—is a constant *post mortem* appearance.

This fulfils the requirements of the Deductive Method.

Our argument is ended. Experience accords with it. Reason-

ing and experiment verify it. If it be said that it wants the scientific character of prevision, it is replied, that it finds an equivalent, in point of certainty, in our power of modifying circumstances—in our power of producing pathological phenomena, in accordance with the theory, and *only* in accordance with it, whenever we will. It is the only possible theory, therefore, which can accord with all the facts.

